BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XL 1908. No. 9

THE CLIMATE OF ANCIENT PALESTINE.

BY

ELLSWORTH HUNTINGTON.

INTRODUCTION.
CLIMATIC HYPOTHESES.
(1) Hypothesis of Uniformity.
(2) Hypothesis of Deforestation.
(3) Hypothesis of Progressive Change.
(4) Hypothesis of Pulsatory Changes.
THE PRESENT CLIMATE AND RELIEF OF PALESTINE.
NATURE OF THE SUPPOSED CHANGES OF CLIMATE.
TYPES OF EVIDENCE AS TO CHANGES OF CLIMATE.
(1) The Population of Ancient Palestine.
(2) Deforestation.
(3) Ancient Routes of Invasion, Migration and Trade.
Sinai.
The Syrian Desert.
(4) Waterless Ruins. Palmyra.
CONCLUSION.

Since Palestine became an object of scientific study a century or more ago, there has been much discussion as to the climate of the country in ancient times. Some writers assert that during the last two or three thousand years climatic conditions have changed greatly. To this, primarily, they ascribe the present poverty-stricken condition of the country. Others, with equal positiveness, declare that such a change is impossible. There is nothing, they say, which demands such an hypothesis: the decay of Palestine and of the neighbouring countries is clearly due to human greed, misgovernment and folly. Among those who have believed in changes of climate are Livingstone,* who wrote down his conclusions upon the subject during an enforced halt on his last great journey in Central Africa; Reclus, whose knowledge of the geography of the world as a whole has rarely, if ever, been surpassed; Fraas, Hull, Fischer, and others. On the contrary side may be ranged the names of Ankel, Conder, Hilderscheid, and Wilson, all of them able thinkers. Some authors, as might be

* A list of references will be found at the end of the concluding part of this article.

MAP OF SYRIA AND SURROUNDING COUNTRIES.

expected, are in doubt. Lartet, for instance, first declared his belief in climatic changes, and later qualified it by declaring that although such changes may have occurred, the main cause of the decay of Palestine is to be found in the foolish conduct of man. He does not consider the question of the degree to which such conduct may have been caused or favoured by adverse physical conditions. On the whole, the weight of authority, so far as numbers are concerned, lies with those who believe in changes of climate. The majority of the most recent writers, however, incline to the contrary belief.

The present diversity of opinion may be ascribed largely to three causes. In the first place, little attention has been paid to the subject by the students of history or anthropology, because the geographers and meteorologists who have discussed the question have rarely pointed out the influence which changes of climate may have exerted upon the habits, industries, prosperity, and political condition of a people. In the second place, writers upon the subject, especially those who do not believe in climatic changes, have laid the weight of emphasis upon the most prosperous part of Palestine, namely the central plateau embracing Judea, Samaria and Galilee. Even to-day this part of the country enjoys a moderately favourable climate. If the rainfall were increased, say thirty per cent., it would doubtless be a great advantage in Galilee, for example; but it would make nothing like so great a change in the conditions of human life as would a similar increase of thirty per cent. in the precipitation of the drier regions of the Tih and Arabia Petræa to the south and southeast of Judea. It is in the peripheral regions, rather than in the centre of Palestine that the chief evidence of climatic changes is to be expected. Finally, a third great cause of the present diversity of opinion as to the ancient condition of Palestine is found in the fact that the attention of students has been directed chiefly to matters where positive conclusions can scarcely be expected, while some of the most important lines of evidence have hardly been touched. Much has been made of the fact that the Bible and other ancient accounts speak of Palestine in a way implying that it was once much more fertile than is now the case. Many attempts have been made to show that in the past the rate of increase of the staple crops was greater than at present, and that plants were cultivated which will not now grow in Palestine. All these lines of argument are interesting and important, but, as Ward and others have shown, they are inconclusive. They depend largely upon human factors which may work either with or against the forces of nature. Man may foster a special crop from mere caprice; he may speak with undue extravagance of the

fertility of his boyhood home; or he may use terms such as desert, drought, and brook with a merely relative significance. To the inhabitant of Arizona these words bear a meaning quite different from that with which they are used by the Englishman. Accordingly, in the discussion of the ancient climate of Palestine it is necessary to eliminate the human factor so far as possible, or at least to appeal to kinds of evidence where the part played by man can be estimated with a fair degree of accuracy.

The question of changes of climate in Palestine possesses a twofold importance. In the first place, it has a most vital bearing upon the fascinating subject of biblical history and interpretation. The accounts of the Exodus; the stories of the Assyrian conquests and of the commerce of Solomon; and the records of the intercourse of Egypt and Syria, and of the populousness and fertility of Palestine in the time of Christ, are all subject to very different interpretations according to whether we accept or reject the theory of climatic change. If the theory be rejected, a choice must be made between two horns of a dilemma. It is necessary either to accept the view of a certain school of critics who hold that a large number of the biblical authors indulged in undue hyperbole; or else to hold with the old-time theologians that in the ancient days God interrupted the course of nature in favor of the Chosen People. If the theory be accepted, a large number of narratives which to many persons now seem improbable become perfectly reasonable.

The second reason for the importance of the study of the climate of ancient Palestine is that the country furnishes, perhaps, the best of all keys to the climatic history of the whole ancient world. Its central position, and the accuracy with which its history is known for 3,000 years, make it possible to use the country as a standard by which to test conclusions as to regions whose history is less well known, or whose climate is such that the effects of change are less apparent. Lying, as it does, on the border between the great desert tracts of Asia and the better-watered countries of the Mediterranean, its climate shares that of both regions. A slight change would have marked effects, especially upon:

> "The narrow strip of verdure strown
> Which just divides the desert from the sown."

If it be true, as a principle, that, in the regions once occupied by the ancient empires of Eurasia and northern Africa, unfavourable changes of climate have been the cause of depopulation, war, invasion, migration, the overthrow of dynasties, and the decay of civilization; and if favourable changes have made it possible for nations to

expand, grow strong, and develop the arts and sciences, Palestine and the surrounding country of Syria ought to show evidence of this as plainly as almost any part of the world. Their history should present a close correspondence between climatic fluctuations on the one hand, and economic, social, and political events on the other. Before the existence or non-existence of any such relation between climate and history can be proved it is necessary first to determine conclusively whether changes of climate have actually taken place; and then to ascertain the extent and nature of the changes and the times at which they have occurred. The purpose of this paper is to present certain facts which bear upon this problem and which indicate its great importance in the study of history.

FIGURE 1. HYPOTHESIS OF UNIFORMITY

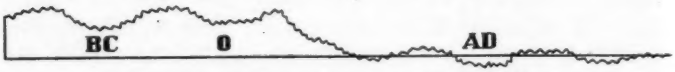


FIGURE 2. HYPOTHESIS OF DEFORESTATION

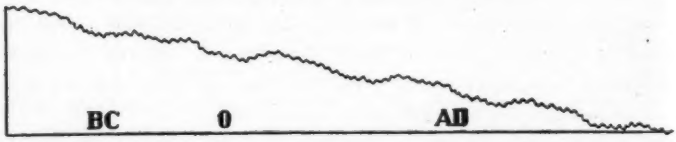


FIGURE 3. HYPOTHESIS OF PROGRESSIVE CHANGE

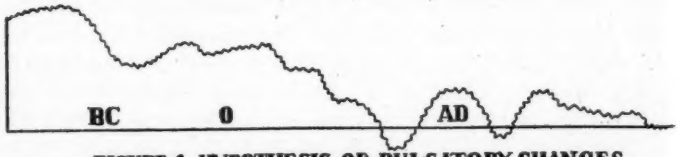


FIGURE 4. HYPOTHESIS OF PULSATORY CHANGES

Climatic Hypotheses.—In the discussion of the climate of ancient Palestine four hypotheses have been advanced. They may be graphically represented by the accompanying diagrams. The horizontal line in each case represents the course of time from the past to the present, the left-hand end denoting a period some three thousand years ago near the beginning of well-known history. The height of the curves above or below the horizontal line indicates the departure of the climate at any given time from the climate of to-

day. An upward curve represents increasing precipitation or falling temperature, or both; a downward curve indicates diminishing precipitation or rising temperature, or both. In other words, high points on the curves betoken relatively cool, damp conditions, and low points warm, dry conditions. In each diagram the line representing the course of climate from past to present is wavy. This is designed to represent the fact that the climate of all parts of the world is subject to variations. It is well known that the climate of a given region, especially in the temperate zone, is characterized at some times by a series of dry or warm years, and at other times by a series of wet or cold years. These variations seem to fall in cycles, the best known of which is the 35- or 36-year cycle of Brückner. There are indications of other cycles having lengths of 3, 11, and 300 years, but these are as yet open to some question.

Hypothesis of Uniformity.—Figure 1 represents what may be called the uniformitarian hypothesis. According to it, during historic time there has been no marked alteration in the climate of Palestine or any other part of the world. The only changes have been those pertaining to the various cycles mentioned in the last paragraph. The climate of a given place may change a little for a few years, but it always comes back to a certain norm. The changes of the historic past are like those of the present with no essential difference either in kind or degree. The best exposition of this view, as applied to the world as a whole, is found in an article by Ward in the *Popular Science Monthly* for November, 1906. While not absolutely excluding the possibility of great climatic changes, he holds that there is no sufficient proof of their occurrence. He gives forcible reasons for believing that a large part of the supposed evidence of change is either untrustworthy, or is easily explicable as the result of the minor changes of the short cycles, especially the 35-year cycle. The uniformitarian hypothesis is largely held by meteorologists. They see that there is no foundation for the current idea that the climate of America or Europe has changed appreciably during the last few score years. They see also that since the beginning of meteorological records there are only very faint indications of permanent changes in temperature, rainfall, and barometric pressure. Knowing how easy it is to make mistakes in the exposure and reading of instruments, they believe that the few indications of change which appear from the compilation of records are the result of error, as many of them undoubtedly are. Meteorologists are thus rendered very sceptical as to all changes of climate, whether past or present.

Hypothesis of Deforestation.—The second figure represents perhaps the commonest of all views as to the climate of Palestine. Many travellers go to the East, and see there what seem to them to be strong indications of a marked change of climate. Having heard much as to the great havoc wrought by the destruction of forests, and finding that where there are forests there is more rain than elsewhere, they jump to the conclusion that the forests "draw" the rain. Certain authors, for example Anderlind, utterly ignore the possibility that the reverse is true, and that the greater abundance of rain causes the forests. There can be no doubt as to the harmful results of deforestation upon the flow of rivers and upon the washing away of the soil. The only question is whether so small a feature as a forest can appreciably affect the amount of rainfall. The many persons who hold this theory believe that Palestine was once well wooded and somewhat more rainy than it now is. Then the forests were cut off, and the climate deteriorated to its present condition.

Hypothesis of Progressive Change.—The exponents of the third hopothesis assume that a change of climate has taken place; but, unlike those who believe in the second hypothesis, they usually make no attempt to explain its cause. They point to a body of facts which seem to them to indicate that in the past there was much more water in Palestine than now. Since the time of Christ, they say, the fertility, habitability, and general prosperity of the country have declined to a greater degree than could possibly result from deforestation or from human negligence and folly. Geologists are especially prone to this view. They find unquestionable evidence that during the glacial period Palestine enjoyed a climate very different from that of to-day. The Dead Sea expanded so as to fill most of the Jordan Valley, as is proved by elevated strands; and glaciers existed upon Mt. Lebanon, as appears from old moraines. The remains of prehistoric man are found in caves with leaves of northern trees such as the oak and maple of Central Europe, and with the bones of animals whose habitat is far to the north. Therefore, the geologists are apt to assume that the change from the climatic conditions of the glacial period to those of to-day has been gradual, and that it has lasted well down into historic times.

Hypothesis of Pulsatory Changes.—The last hypothesis, that of pulsatory changes, represented in Figure 4, is an attempt on the part of the author to harmonize two groups of facts part of which agree with the uniformitarian hypothesis (Fig. 1), and part with the hypothesis of progressive change (Fig. 3). That is, there seem to

be some facts indicating strongly that conditions like those of to-day existed one or two thousand years ago; while other equally salient facts apparently point to greater rainfall or lower temperature in the past than in the present. The only way to explain the two sets of facts seems to be by supposing that the climate of Palestine and other countries has been subject to fluctuations of considerable amplitude, although on the whole the tendency has been toward warmth and aridity.

THE PRESENT CLIMATE AND RELIEF OF PALESTINE.—The two fundamental facts which determine the nature of the climate of Palestine are, first, the location of the country in reference to the great climatic zones of the earth as a whole, and, second, its location in reference to the Mediterranean Sea. These, in conjunction with the relief of the land, give Palestine a peculiar climate. The great extent of the land-mass of Asia and the high degree to which it becomes heated under the rays of the summer sun cause all the climatic zones in that part of the world to be strongly deflected northward. Palestine lies normally in the zone of prevailing westerly winds where rain is supplied more or less abundantly by cyclonic storms of large dimensions moving for thousands of miles from west to east. During the summer, however, this zone is deflected so far to the north, that its place is taken by the rainless subtropical zone of dry descending air, or by a modified form of the trade-wind belt, where the winds blow prevailingly from a northeasterly quarter. In the case of the zone of descending air there is no rainfall, because, as the air comes down, it becomes warmer, and hence relatively drier, so that it absorbs moisture instead of giving it up. In the case of the modified trade-winds, if the air comes to Palestine from the east it has blown over the dry interior of Asia, and has had no opportunity to collect moisture. If it comes from the north, it has had scarcely better opportunities to collect moisture than if it came from the east, and it is also moving into warmer regions, where its capacity for holding moisture increases, and it, of course, gives up no rain. Thus it happens that Palestine has a long dry season from April to October, and a rainy season during the other half of the year. During the rainy season the prevailing winds blow from the west. Having come across the Mediterranean Sea, they are abundantly charged with moisture. When they reach Palestine the relief of the land causes them to rise rapidly. Hence they are cooled, and discharge their moisture in abundant showers. During the winter a large portion of Palestine has quite as much precipitation as most

parts of England or of the eastern United States. There is a little snow, but far the larger part of the moisture comes as rain.

Palestine is divided into regions of two sharply contrasted topographic forms,—plateaus and plains. The chief cities and the densest population, contrary to what is the case in most countries, are situated upon the plateaus. The plains are well populated, but they have always been of relatively small importance in history. They are three in number, the maritime plain along the Mediterranean coast, where the Philistines once dwelt; the low, warm plain of the Jordan Valley; and the plain of Esdraelon, running from west to east and connecting the other two a little south of the Sea of Galilee. The plateaus consist of Galilee, Samaria, and Judea in order from north to south on the west side of the Jordan, and Bashan, Gilead and Moab from north to south on the east side of the Jordan. The plains are rich now, even as they have always been. They can be irrigated by means of the streams which come from the plateaus. In the past, irrigation does not appear to have been of great importance, but year by year it is assuming a more prominent place in the economic development of the country. The plateaus cannot be irrigated except in occasional places where the water of a spring can be led along the hillside to an orchard or vineyard. For staple crops such as wheat and barley, which occupy a large area, extensive irrigation is impossible. Now, as always, the plateaus depend upon "the rain of heaven." The people store it up in cisterns for the use of themselves and their cattle during the long dry summers, and trust the efficiency of prayer to supply a due amount for the crops in the late fall and early spring. The plateaus, where the strength of Palestine has always resided, are the parts of the country most sensitive to a diminution of rainfall.

Nature of the Supposed Changes of Climate.—In considering the four theories of climatic change set forth above, it must not be supposed that the changes demanded are of a very radical nature.

During historic times there has doubtless always been a wet, rainy season in winter, and a long dry season in summer. The most that is assumed is that the rainy season may have been somewhat longer and moister than at present, with a greater number of days upon which rain or snow fell; summer storms, which are now very rare, may have occurred fairly often; and the mean temperature of the year or of the winter may have been lower than is now the case. Such changes, even though slight, would have a great effect upon the habitability of the country. Geologists and physicists who have made a special study of the glacial period have come to the conclu-

sion that a diminution of from 10° to 15° C., or 18° to 27° F. in the mean temperature of Europe or America would suffice to cause a recurrence of glacial conditions such as those through which the earth has recently passed. It would cause the United States to be covered with ice down to Long Island and Cincinnati, and would make a large part of the rest of the country as uninhabitable as northern Canada now is. This being so, it is clear that a change of from 3° to 5° F. in the mean annual temperature of Palestine, with corresponding changes in precipitation and evaporation, would have a marked effect upon the habitability of the country.

The most serious disadvantage in the climate of Palestine to-day is not lack of rain. From 1860 to 1906 the average precipitation at Jerusalem amounted to over 26 inches per year, which is about the same as that of the State of Minnesota. Practically all the rain, however, comes in the colder half of the year, when it is of little use for vegetation. Of the total amount of 26 inches, 25.5 inches falls during the six months from November to April inclusive, and 21.5 inches in the four months of December, January, February and March. From May to October inclusive there is almost no rainfall, and April has but little. The seasonal distribution of rain in Palestine much resembles that in central California, although the rainy season in the Asiatic country is somewhat shorter than in the American State. Santa Cruz, near Monterey, on the coast a little south of San Francisco, is one of the rainiest places in California outside of the high Sierran region. It had an annual precipitation of 26.8 inches from 1873 to 1903. Of this amount, 23.3 inches fell during the six months from November to April inclusive, as against 25.5 in Jerusalem, while 18.3 inches fell in the four months from December to March, as against 21.5 at Jerusalem. It thus appears that the rainfall of Jerusalem is very much like that of Santa Cruz, although more concentrated during the winter months.

In Palestine, if the rains at either end of the rainy season, the "former" and "latter" rains, do not come at the expected time or are not sufficiently heavy, the crops fail more or less completely. Hence, a slight lengthening of the rainy season would be of very great value in giving assurance of moisture enough for at least moderate crops. If the winter temperature were lower, it would also be a great advantage. Where the winter precipitation takes the form of rain, as it usually does in Palestine, much of the water runs off, and there is danger that the ground may not become completely soaked. If the precipitation takes the form of snow, this melts gradually and the ground becomes thoroughly saturated. The spring rains serve

to keep the surface wet. Thus, when the rainy season comes to an end, there is a large body of underground water to support the growth of plants, especially of trees which require water late in the season, and to sustain the flow of springs and other sources of water for irrigation. It would, therefore, be a very great advantage to Palestine if the winters were a few degrees colder, so that snow fell more abundantly and stayed longer than now, and if the rainy season were a little longer, so that there would be less danger of drought in the critical seasons of fall planting and spring growth.

In the following pages it must be borne in mind that it is a change of this sort which is postulated. One writer compares the climate of ancient Palestine to that of England to-day. Such a comparison is misleading. It involves a complete change in the regimen of the seasons. If the climate of Palestine during historic times were ever different from what it is to-day, it probably resembled that which would now prevail along the Ægean coast of Asia Minor if the relief of the land and its relation to the sea were like those of Syria.

(To be continued.)

THE HUMAN SIDE OF SYSTEMATIC GEOGRAPHY.

BY

WALTER SHELDON TOWER, PH.D.

The scientific study of any complex subject in its varied branches depends on the recognition of two fundamental principles: first, the determination of the scope of the subject, and, second, the adoption of some logical method of treatment. In the case of geography, at the present time, the scope of the subject is admittedly the study of the earth in its relation to life. By this definition geography is made to cover the entire field of studying and analyzing every type of land form and the way in which each type controls, modifies, or prohibits entirely animal and plant life in that region. Theoretically, these two correlated aspects of earth study stand on exactly the same plane, neither being subordinate to the other. If either aspect may be said to outweigh the other, a strict interpretation of the definition would seem to make the life element the important point, since earth study becomes geography only when it is considered *in its relation to life*. Taking man as typical of life in general, the definition might

be restated to read: geography is the study of the earth as a dwelling-place for man.

Looking at the question from different points of view, different writers emphasize quite diverse phases of the subject. The usual text-book of geography makes the land forms most prominent and subordinates all life relations, the extreme of this type being represented by the "physiographers" who make their subject essentially synonymous with dynamic geology. A biologist, on the other hand, lays most stress on distribution and adaptation of species, just as the economist and historian put forward the items which appeal most strongly to their particular interests. The Shenandoah Valley, for example, appeals to the physiographer as an excellent illustration of a valley developed in a folded mountain region during the second or third cycle of erosion, and his interest lies in the dynamic processes by which that valley was produced. The biologist regards the same valley from the standpoint of the different plant species which are found farther north in the valley than they are on the adjoining mountain sides, or perhaps as a line along which insect species have spread. The economist sees in it the greater productivity per acre because of the fertile limestone soils and favourable climate; while the historian considers the valley as a highway for the advancement of colonial settlements, or as a factor in the Civil War and especially in the Battle of Gettysburg. Widely diverse as these different attitudes are, they are all a part of the great field of geography and they all strive toward the same end: the interpretation of the earth on which man lives, with the relationships existing between surface conditions and the varied forms of life. It is rare, however, to find these closely correlated responses so associated one with another as to show all the ways in which a valley may be an important controlling factor. In short, the scope of geography is recognized clearly enough, but in reality the life element, even the human side of the life element, is relegated to a distinctly secondary consideration.

The second fundamental principle of scientific study is that of logical treatment according to some system in which common characteristics are taken as a basis of classification. The disputed status of systematic geography need not be argued here. It is sufficient to recognize the fact that, in the case of dealing with land forms, at least, practically every one makes use of some sort of system of classification. The designation *systematic geography* is in common use, but in many ways the name is inexact; systematic physiography would more nearly cover the usual meaning which lies back of the term. The truth of this statement can be seen from the fact that the

systems of classification are invariably based solely on physical characters of land forms, and where used at all they are almost entirely limited to this single phase of the subject. The consideration of life relations is almost invariably made a minor consideration, consisting of hardly more than a few general suggestions, despite the fact that to the average student the study of geography increases in interest and value with increased emphasis on the human side.

The usual scheme of classification in systematic geography rests on a twofold basis: first, a division into classes on the basis of rock structure; and, second, a subdivision of the classes on the basis of the varying amounts of erosion which have modified similar structures to different degrees. According to such a system, land forms in general fall into three broad classes depending on increasing complexity of geological structure. These three classes, plains, plateaus, and mountains, are then subdivided into young, mature, and old, according to the stage of erosion. Occasionally, as in the case of belted coastal plains, and almost always in detailed regional studies, it becomes necessary to add rock texture as a basis for still further subdivision, since varying texture is an important factor in determining the minor forms resulting from erosion. Such a system carries out a definite correlation of one class with another, and of any one member of a class of land forms with all other members of the same class. Thus a plateau in central Asia can at once be directly compared with a plateau in the eastern United States merely by stating in what respects each one diverges from the type plateau. Such a classification, broad enough to include every type of land form known to exist, is easily formulated, and from its application to land forms alone has arisen the appellation systematic geography.

Geography, however, includes not one phase alone, but the two coördinate phases: types of environment, and responses of life to these types—two elements on an absolutely equal footing. But the only logical systems of classification thus far formulated depend solely on dynamical geology bases. Hence, when a classification of life responses to environment is attempted, the existing systems are found to hold good in some cases and not good in others. For example, certain similarities in the types of mountain life found almost everywhere can be readily grouped under the simple head of mountains. Then, to speak of a mountainous region will in most cases suggest hardy mountaineers, difficulties of travel, tendencies toward clannishness among the people, isolation from the outside world, and, hence, scanty population. It would be necessary, however, to make many exceptions from the general conditions, if the discussion of life

in mountains is to be made complete; as, for example, in the case of the tropical portions of South America, with its large cities and denser populations characteristically located in the elevated and mountainous districts. Yet this example of man's response to his environment is not in any way an exception; on the contrary, it is exactly what would have to be expected both there and elsewhere under the same conditions, if all the important factors in environment were taken into consideration.

In short, the system of classification which is satisfactory for land forms is inadequate when it is applied to the grouping together of all life responses in their proper relations and with provisions made for the many types of responses which are clearly recognized. The complication arises from the fact that the earth's surface,—land and water,—does not constitute the whole environment. Any system of treatment based solely on these considerations must fall short by just the amount that land and water fail to constitute the whole environment. A third factor, more important than both the others in this controlling influence over life, is found in the atmosphere, a part of the earth as truly as the ocean is a part of the earth. Hence, the atmosphere, with its different phenomena, is necessarily to be considered in the study of the earth in its relation to life. Give a region every possible advantage of surface form and position, but deprive it of beneficial warmth or sufficient rain, and the question of life in that region is quite different from what it would be with both heat and moisture. Too much heat or too much moisture will again produce an entirely distinct series of results. It is manifestly impossible, therefore, to advance very far in a systematic analysis of the human phase of geography, if the physiographic basis of classification is followed strictly. The world as a whole is now fairly well known in so far as physical characteristics are concerned, and the different types have found their appropriate places among land forms in general. The interpretation of these areas from a geographic basis is the sort of work which must become most prominent in the future.

The need for a systematic classification which shall be fitted for this human side of geography becomes increasingly urgent, if the whole subject is to be reduced to a logical correlated study rather than degenerate into mere descriptions of individual cases by themselves. The problem of framing a satisfactory classification of this sort is more complex than formulating a system for the grouping of land forms. The classification for human responses cannot well be separated from the different types of land forms, since surface condition alone prompts many responses, such as freedom of travel over plains,

or the location of towns at the junction of two important valleys. The new classification, therefore, must begin with the existing scheme as supplying a basis for certain general relations, and from that go on to add new bases of division in order to provide for the grouping of all the important phases of environmental control. This union of the physiographic classification with another scheme based on other controlling influences will permit a more detailed grouping of human responses, and bring forward relations which have not been made prominent heretofore. In fact, it seems not unlikely that the real neglect or disjointed treatment of the human side of geography in otherwise highly satisfactory texts has been due largely to the adherence to the strictly physiographic bases of classification, in which only the broadest generalization regarding human influences can be accommodated.

The important additional element to be considered is the control exerted by atmospheric conditions, or climate, since areas similar in surface forms may differ greatly in this very important respect. In the study of physiography alone there is little place for the consideration of climatic effects, since their importance in the modification of land forms is minor rather than major. In the study of life responses to environment, however, the consideration of climate cannot be avoided if the analysis of cause and effect is to be at all complete. Under most conditions, in fact, climate is probably more important than any other single factor, though, as in mountains, the climate may be directly controlled by land form. Climate, however, is an average of many conditions, in which average one strikingly variable element may be more important than the combined effect of all the other elements in determining life controls. Yet in using climate alone this significant variation would not appear to be prominent. It becomes necessary, therefore, to introduce into the discussion the effect of special climatic factors and controls in order to bring together the proper cause and its results. Thus the *campos* of Brazil owe their special characteristics not to the fact that they are plains, nor to the fact that they are plains in the tropical zone; but to the particular association of plains, tropical zone, and a distinct division of the year into a wet and a dry season in that zone. On the other hand, *prairies* in the United States, *tundras* in Siberia, and, in fact, other plains in the tropical zone itself, may resemble the Brazilian *campos* in every superficial aspect, with entirely different results in the essential controls of life. These differences have long been recognized,—in fact, in one way or another, they usually receive some sort of mention in the average text,—but they are not

presented together; the force of contrast disappears and the whole striking lesson of geographic control and result is lost. It is evidently desirable, then, to have a basis of subdivision on which plains of the campos type with their life controls may be differentiated from plains typified by the prairies of the United States and from the Siberian tundras. On the physiographic basis they would all be classed together because of their geological structure or stage of erosion; whereas, the control of life by special climatic factors, in which they differ widely, is no less important than that of the plain surface. The climatic factors and controls which in general stand out most prominently in affecting life are temperature, rainfall, and wind; latitude, altitude, and distribution of land and water. Each one of these elements must at times be used to give the correct explanation of observed conditions, and by their use, *along with* the different types of surface form, geography becomes in truth the study of the earth in relation to life.

The application of this system to the human side of geography can be readily illustrated by taking plains as an example. The classification of plains as land forms remains unaltered with the introduction of the climatic element since the mere surface forms vary but little between regions of different climates. The conditions of life on plains, however, are no longer grouped as one great whole or taken in their broad similarities with endless exceptions and special items to be described separately. Starting with the chapter heading *Plains,* it then appears that the most satisfactory subdivisions are to be made on the basis of temperature and rainfall, since these two elements are the primary controls in the distribution of plant and animal types on which human life so closely depends.

Such a grouping would be made as follows:

Plains—three classes:

(A) Tropical—3 sub-types.
(1) Humid. (2) Semi-arid. (3) Arid or desert.

(B) Temperate—3 sub-types.
(1) Humid. (2) Semi-arid. (3) Arid or desert.

(C) Polar—1 sub-type.
(1) Frozen.

The elaboration of this system can be carried into great detail by introducing more specific bases of divisions; as, for instance, seasonal distribution of rainfall in humid plains, or trade wind and mountain barrier influence on deserts. To illustrate the way in which such a classification facilitates ready comparison of different life elements

in plains, tropical and temperate regions may be contrasted with respect to certain important characteristics:

General title—Plains:

(A) Tropical plains—no distinct change of season as far as temperature is concerned. Mean annual temperature, 68° F. or over.

1.—Humid tropical plains—rainfall 30 inches or over. Abundant vegetation—tropical species.

1. (a) Humid at all times, vegetation of jungle type; certain valuable vegetable products; population mainly low native; travel difficult; unhealthful fevers.

1. (b) Humid one season; *i.e.,* wet and dry seasons of year. Vegetation grassy, few or no trees; population higher types, farmers and cattle raisers; travel easy in dry season.

2.—Semi-arid tropical plains—rainfall 15-30 inches. Scanty vegetation—forest absent; travel easy.

2. (a) Irrigable — agriculture; permanent settlements.

2. (b) Non-irrigable—grassy only. Agriculture not possible. Sparse population. Grazing; great ranges for cattle. Semi-nomad native.

3.—Arid or desert tropical plains—rainfall under 15 inches. Vegetation of desert type, spiny or fleshy; travel difficult; small nomad tribes—robber types. Streams intermittent; irrigation from underground sources only.

3. (a) Oases—agriculture; fruit trees; cross roads of travel—oasis cities.

(B) Temperate plains—warm summers; cool or cold winters. Mean temperature of summer not less than 43° F.

1.—Humid temperate plains—rainfall 30 inches or over. Abundant vegetation—temperate species.

1. (a) Humid at all seasons. Forests usual—originally. Dense population and most advanced civilization; extensive agriculture—grains; travel easy; healthful.

1. (b) Humid at one season. Forests scanty. Agriculture—special crops; *e. g.,* winter wheat; live-stock grazing—mainly cattle.

2.—Semi-arid temperate plains—rainfall 15-30 inches. Vegetation grassy, special forage crops and grain species; forests absent.

2. (a) Irrigable—agriculture.

2. (b) Non-irrigable—grazing only—largely sheep. Winter ranges bad—separate ranges for two seasons.

3.—Arid or desert temperate plains—rainfall under 15 inches. Desert type of vegetation.

3. (a) Irrigable from mountain streams. Development possible.

It might be claimed that the divisions used here are arbitrarily made, but each one is based on natural controls. The division between tropical and temperate plains on the basis of seasonal change corresponds to the distribution of important plant species, such as the palm, for example. In the difference of Nature's bounty in vegetation which coincides with the distribution of the palm species is found a vast series of responses on the part of man. The subdivision on the basis of rainfall finds justification in the fact that twenty inches of rainfall corresponds more or less closely to the dividing line between possible and impossible tillage crops; a dividing line which also marks distinctly different conditions of human life. The introduction of the semi-arid sub-type removes much of the objection which might arise if a hard and fast separation were made on the twenty-inch basis. It is impossible to avoid some measure of arbitrary separation in the same way, as it is impossible to draw any but an arbitrary line of demarcation between plains and plateaus. No one ventures to say just what the line of division shall be in that case, any more than one ventures to say how much tilting of the strata must take place before a broken plateau would pass into a region of block mountains.

Such a classification as is here outlined can be applied in the same way to the other large groups of land forms by adopting the appropriate bases of subdivision. If need be, to include types not readily placed here, further grouping can be readily made, as, for instance, the use of altitude as an added basis for grouping tropical plains, since altitude is there an important factor.

The observance of these additional elements in systematic geog-

raphy makes it far easier to present the whole interrelationship of earth and life both from the standpoint of being able to include all important life controls in their proper places, and also from the standpoint of giving a definite correlated idea of the whole. This latter very desirable object is impossible where the classic treatment is adhered to; that is, where the grouping of land forms is made simply on the basis of geological characteristics, and the atmosphere with its results is treated separately. The effect of climatic conditions on the life in plains is different from the effect of climatic conditions in mountains, but in each case it is a very essential part of the environment, and a logical geographical treatment should make the types of earth environment into complete entities. Not until surface forms and climatic conditions are regarded as making single definite units and are studied as such, can geography attain its highest development and become, in fact as well as in definition, the study of the earth in its relations to life.

UNIVERSITY OF PENNSYLVANIA.

STATE GEOLOGICAL SURVEYS AND PRACTICAL GEOGRAPHY.*

BY

FRANK CARNEY.

The expression "practical geography," as used in this paper, implies, not essentially the utilitarian or economic phase of the subject, but the rational as opposed to the idealistic, the possible as opposed to the highly improbable or impossible. What we could accomplish in the way of right geography, and what, as a matter of fact, we are able to accomplish in the near future, are disproportionate quantities. But we do not desire the idealist to become less active; he is the standard-bearer, and when at some future time this country shall have attained the position in geography even now reached in England, we may grant that the man who always advocated the very best did more than half the work. In the meantime, it may not be futile to point out some lines of activity possible for Geological Surveys, organizations already well established and sustained in many of the States. Not only these organizations, but many others, both State and national, are constantly producing much matter that is

* Written for the Chicago Meeting of the Association of American Geographers.

strictly geographic, but which for purposes of geography is unused and will continue useless till properly correlated. The correlation of this material, and the accomplishment of a few other suggestions, appear to the writer practicable at the present time.

No one would underestimate the progress being made in this country in geography. The encouraging conditions furnish an incentive to hasten much better conditions. In our colleges and universities are a number of men employed solely for giving instruction in geography, and other institutions are considering the establishment of chairs. Even in secondary schools the physiographic side of geography, at least, is receiving more attention. The organization of local geographic societies is another evidence of progress.

Of the various agencies through which further and more prompt progress may be effected, the Geological Surveys seem the most worth while considering. If by some necromancy we might at once bestow upon all individuals who are now giving instruction in geography a good training, making them reasonably well-equipped geographers, even such proficiency as domestic institutions can give, we would look no further. For the trained progressive teacher the innovations outlined in this paper have no personal application. In the following paragraphs I briefly consider six ways in which the Surveys might further the interests of geography:

Publications for Teachers.—The publications of our State Surveys contain much that is useful to the secondary school teacher; this is especially true of the economic reports, though there is an objection common to nearly all these publications; they are prepared for the class of critical and informed readers represented by the authors of the reports. No one would suggest that in this respect Surveys should deviate from the present method; such reports must not only be abreast of their phase of the science, but should also make contribution to it.

Nevertheless, it is evident to all that reports of this type can not be of greatest benefit to the average teacher of geography, and it is this teacher with whom we would labour in advancing scientific geography. To this end might not our Surveys prepare special and supplementary reports specifically for teachers? If these teachers as a class were readers of the geographical journals, the desired object might be partially accomplished; but we know they are not; furthermore, publications prepared by their own State for them in particular would make a more certain appeal. The publications I have in mind should be of two types:

(a) As illustrating the class of special reports, one of these should

aim at instilling a better concept of geography as a science. There is no lack of general books of method in geography, but we need terse treatments of the basal principles that should govern instruction in regional and systematic geography, emphasizing the interrelation between the organic and inorganic parts of the subject, and impressing the necessity of a strict terminology. While in a few text-books some or all of these ideas may be exemplified, they are not given the prominence that insures an appreciation of their importance.

(b) Supplementary reports summarizing for teaching purposes the more extended publications would be of great aid to the schools. For example: In recent years several States have issued extensive studies on their clays and clay industries. In nearly every case these were prepared by specialists; they contain much that is purely technical, besides facts that contribute to human relations; the facts bearing on geography admit of correlation, affording in particular an opportunity to emphasize the organic.

Some States have issued reports on one or another phase of physiography; others are engaged on more extensive physiographic studies. These contemplated publications may be strictly physiographic, embodying only the inorganic, in which case they will disregard half their scope for usefulness in the schools.

Type Sets of Topographic Sheets.—The laboratory manuals in physiography leave no occasion for reference to this topic, so far as classes in that subject are concerned. It is seldom, however, that we find topographic sheets used with classes in elementary geography. These younger pupils, consequently, do not get any conception of the map representation of relief. For their teachers, for the classes, and for older students as well, it would be a great service if Surveys were to provide at a minimum cost mounted sheets illustrating types of topography; so far as is possible, the sheets should be selected from the State concerned. Concise, lucid explanations should accompany the maps.

I am aware that teachers and school boards may secure these maps directly from Washington. But the sheets are not extensively used even in high schools. Their use would become more general if some organization of the State were to take an active interest in seeing that the proper sheets are selected, that these are made more durable by mounting, that their import is to some extent particularized upon, and that the subject of using such maps is brought directly to the attention of the parties who should use them.

The need of good maps in the schools was cogently amplified be-

fore this Association one year ago.* The best maps of home areas available are those issued by the U. S. Geological Survey; the more extensively they are used, the less will be the demand for mediocre maps.

Industrial Activities.—The State supplements of many school geographies usually give special attention to industrial activities; often maps are used in showing the distribution of areas of certain natural products, of the several lines of manufacturing, of particular phases of agriculture, etc. Some of this information is rendered obsolete or incomplete in a very few years; other data, usually illustrating the organic part of geography, appear, so that no matter how satisfactorily these phases of geography were treated in the original edition of the supplement, they are shortly out of date. Two or three years often witness marked changes in the activities of many localities. The fact that there has been a change is not so important in geography as the reason for the change. It is mainly in the industrial lines that innovations arise. The publishers of State supplements can not be expected to investigate and announce these activities with the promptness and thoroughness desired. State Geological Surveys can do this; furthermore, their efforts are not constrained by mercenary interests as with competing publishers.

Field Work.—Some years ago the New York Survey published a "Guide to Excursions in the Fossiliferous Rocks of New York State." This little bulletin is a type of publication that other Surveys might adopt, greatly to the advantage of geography. While the schools of each region must depend largely on the immediate locality for illustrative field work, at the same time each State possesses some features, valuable for study but localized, which should be generally known.

A thickly populated part of a State suggests several lines of investigation which a Survey can treat without in the least discouraging the initiative of local teachers. It is seldom that a city is so completely self-developed that a study of its factories, etc., does not at once lead into relationships of environment, active and passive. The tracing of these relationships may be a matter of considerable study, but of sufficient importance to deserve the attention; the explanatory treatment thus given a particular phase of a city's activity visited by a class is good geography.

The School Museum.—The school museum as an auxiliary in teaching geography is of recognized value. The large permanent museums of certain cities and of some institutions may be of in-

* Cyrus C. Adams, Bull. Am. Geog. Soc., vol. XXXIX, p. 6, 1907.

estimable aid locally, but it is a fact that such collections seldom make an appeal commensurate with their intrinsic worth, save to a few investigators or advanced students. The completeness of such museums is both an advantage and a disadvantage. It is a question whether the circulating school museum as managed in the city of Chicago is not of greater advantage for the purpose designed. The plan brings the material right into the classroom where there are no distractions arising from strangeness and from the multiplicity of objects, as is the case when the class is taken to a museum.

The assembling and management of circulating museums might be undertaken by State Surveys. Additional appropriation should be procured to start the work; if not, increased appropriations will surely come after an exemplification of its value to the schools of the State. Exchange of material between State Surveys would be the normal method of augmenting collections, particularly of natural resources. Thus rocks, ores, minerals, fossils, and illustrations of particular phenomena, as glacial scouring, and marine grinding of given areas, would be added to the collections of other States. The museums of State colleges and universities should be the clearing-houses for this material.

A participatory method might be instituted by which school boards would pay transportation charges on the collections needed. Furthermore, the schools themselves, in localities where desirable material is to be had, might be utilized in collecting for the State, at the same time encouraging the schools to arrange permanent collections.

Manufactured products, so far as is practicable, should have a large place in these collections. Every such product is either a response to a particular environment, or a less immediate and direct but no less important fact of organic geography.

Bibliographies and Digests.—The quantity of matter, primarily or incidentally of geographic value, issued by both government and private presses is so great that even the teacher who is giving his entire time to this study depends to some extent on the reviews and digests appearing in journals, and in bulletins of geographical societies. That the instructor who is dividing his time with other subjects can not keep abreast in geography is apparent; furthermore, it is the exception if this instructor, when he enters upon his work, is broadly acquainted with the literature. For this reason it seems advisable to place in his way the means of strengthening his preparation, and of keeping up to date. Periodical bibliographies and reviews of the recent books and articles would stimulate this activity and insure progressiveness. Surveys could exercise a selective treat-

ment in the preparation of such bibliographies and subjects for digesting, thus eliminating the features less pertinent to the teachers and schools of their States.

Conclusion.

To accomplish much of this means that Surveys should employ geographers, or the best trained men that may be secured. Where this is not feasible, the coöperation and part-time assistance of men in teaching positions would be of advantage.

The outlook is encouraging, particularly where Surveys are broadening their scope by giving attention to industrial and economic activities, and by directing investigation in phases of natural history. Regional geography is thus intensified, a work which should precede a well-founded systematic geography, because a satisfactory system presupposes a consideration of a high percentage of the facts which the system would compass.

Even the little that is being done by the least affluent of our Surveys furnishes data and opportunity for advancing better methods in geography. All that is needed is an amplification of work in few lines; an emphasis wherever the schools may be reached, both in instructing and inspiring the teachers and by supplementing the outfit of the class-room; and a correlation of data produced by the Survey, and, to as great an extent as is practicable, by other similar organizations.

THE DEMARCATION OF THE ALASKA BOUNDARY.

A paper on the progress of the Alaska Boundary Survey, read by Mr. O. H. Tittmann on April 24, before the American Philosophical Society, has been reprinted from its *Proceedings* (Vol. xlvii, 1908). The total length of the boundary between Canada and Alaska is 1,200 miles, naturally divided into two sections of about 600 miles each. One is the section bounded by the 141st meridian, concerning which there has been no dispute; and the other is the part of the boundary that delimits the stretch of coast extending from the neighbourhood of Mount St. Elias southeasterly to and through the Portland Canal. This was happily settled by the Tribunal of London in 1904.

Mr. Tittmann, representing the United States, and Mr. W. F. King, on behalf of the British Government, were appointed commis-

sioners to delimit the part of the boundary that had been in dispute. They at once entered upon their duties guided by maps on which the Tribunal had marked certain mountain peaks as the mountains contemplated by the Treaty of 1825. Mr. Tittmann gives the following summary of the progress of the work:

"It is the business of the commissioners to identify the peaks, to establish their geographical position, to mark by visible monuments, wherever possible, the turning points in the line and such other points as may be necessary, and to describe and define the line between the points selected by the Tribunal. There was a stretch of about one hundred and twenty miles where the topographic information was insufficient, and there the commissioners were directed to make additonal surveys and to select mountain peaks within certain prescribed limits to define the boundary. The commissioners decided to mark at once certain river crossings and the mountain passes and to connect all the boundary peaks by a continuous triangulation based on the trigonometric datum adopted by the Coast and Geodetic Survey for southeastern Alaska.

"The boundary line, starting from the neighbourhood of Mount St. Elias, crosses that summit and other high peaks of the St. Elias Alps and the Fairweather Range. In general, it lies amid perpetual snow and ice except when it drops abruptly into the river valleys only to rise again into regions of perpetual snow. Finally, it reaches the head of Portland Canal and becomes a water boundary.

"In the four years since work was begun on this portion of the boundary the commissioners have fixed trigonometrically all the peaks except two near Mount St. Elias and those in the region between the Whiting River and Devil's Thumb, and some of the peaks south of the Unuk River. The passes, valleys and river crossings have been monumented with the exception of the crossing of the Alsek in the north and the valleys of the affluents of the Iskut and the crossing of the Le Duc and Chicamin rivers in the south. The turning points of the water boundary in Portland Canal also remain to be fixed by reference to points on shore."

According to the Treaty of 1825, the 141st meridian west of Greenwich forms the eastern boundary of Alaska from the Arctic Ocean to near Mount St. Elias. In 1889, twenty-two years after the United States had acquired Alaska, our Government took the first steps towards establishing the location of the 141st meridian on the ground. The Coast and Geodetic Survey sent parties to the Yukon and Porcupine rivers to determine the boundary crossing of those rivers. The Canadian Government had sent an engineer to

the Yukon in 1887 to make an astronomical determination of the boundary. The surveyors were compelled to determine the longitude by lunar culminations and occultations, and the American parties spent a whole winter in observing them. The work of the three parties, however, was not carried on under an international agreement, and the results, therefore, were not reciprocally binding upon the two Governments.

The discovery of gold and the general development of that region, however, led to the construction of a Canadian overland telegraph line to Dawson and beyond, and, later, the United States laid a cable from Seattle to Sitka and thence to Valdez on Prince William Sound, whence an overland line was built by the United States War Department as far as Fort Egbert on the Yukon, near the boundary.

This important auxiliary to longitude determination made it possible for the two Governments to determine the position of the 141st meridian with all the necessary accuracy as soon as an agreement was reached and embodied in the treaty signed at Washington in August, 1906. This treaty provided for the survey and demarcation of the line, and before the end of that summer the telegraphic determination of the Yukon River crossing of the 141st meridian had been completed. The telegraphic determination made by the Americans rests on the known longitude of Seattle. Signals were exchanged between Sitka and Seattle, Seattle and Valdez, Valdez and Fort Egbert, Fort Egbert and the boundary. That made by the Canadians rests on the longitude of Vancouver, between which place and the boundary time signals were exchanged. As the difference between Seattle and Vancouver was also determined by the commissioners, the circuit was closed and a very satisfactory agreement was obtained.

Mr. Tittmann adds that in order to avoid all questions that might arise from local deflections of the zenith, it was provided by the Treaty of 1906 that the commissioners should determine by the telegraphic method a convenient point on the 141st meridian and then trace a north and south line passing through the point thus ascertained. This provision fixed the telegraph crossing of the boundary as the initial point for the longitude determination. The commissioners desired to make the determination as nearly on the 141st meridian as possible, in order to avoid a deflection error which might have been involved if the longitude had been obtained by linear measurement from a longitude observed at some distance from the boundary. The transit pier erected for the purpose of exchanging time signals was found to be in longitude 141° 00′ 00″ .4, a very close

hit. It is interesting to note also that the final longitude differed only 9".43 of an arc, or 410 feet, from that derived by moon culminations about twenty years before.

The work of tracing the boundary southward from the Yukon was begun in the spring of 1907 and was carried southward a distance of about one hundred and twenty miles. Aluminum-bronze monuments were erected on the north and south banks of the river, a trigonometric and topographic survey was made extending two miles on each side of the boundary for a distance of about forty-five miles, and a broad vista was cut through the woods for the same distance. The work planned for the coming season will carry the tracing of the line as far as the great mountains south of the White River, and the topographic survey and the monumenting will be pushed until the severity of the weather compels the surveyors to abandon the work and turn their faces homeward.

ORIENTATION OF MAPS.*

BY

F. P. GULLIVER.

OBJECTS OF PAPER.—From a study of the present conditions in elementary schools, the writer has come to the opinion that one of the fundamental difficulties in obtaining a clear idea of what a map represents lies in the fact that many of the maps first shown pupils have various orientations. He believes that if the north point on all maps were always placed at the top of the page much less difficulty would be experienced in teaching pupils to realize clearly that a map represents a certain definite portion of the surface of the earth.

If all maps followed the same rule in regard to their orientation there would be fewer adults who would say, as so many do to-day, "Oh, I cannot use a map, for it does not mean anything to me."

Children are taught their letters and are then taught to read words on the printed page. Children are also taught musical notes by ear and are then taught to read these musical notes from the printed music. In the same way children should be taught to see a certain portion of the surface of the earth, and then should be taught to read similar facts from printed maps. Books are printed with a definite orientation of letters and words; music is also printed

* Read before the Association of American Geographers, January 1, 1907.

with a definite relation to five lines of the staff; maps should likewise conform to the definite rule of position on the page. The child may then be taught that he would see the surface of the earth as it is represented upon a map, if he looked down upon it as a bird would do in flying through the air from the south to the north.

EARLY MAPS.—When the idea prevailed among men that the earth was flat, maps were drawn of the known portions upon sheets of the most convenient size to show what was desired. Some early maps were represented with the east at the top. An example of this is the Mappe-monde of Albi, the earliest mappe-monde now in existence. It illustrates the cosmography of Julius Honorius and of Orosius in a manuscript of the eighth century. It is a poorly made sketch with mistakes in relative geographic position of countries. (See Beazley, Dawn of Modern Geog. I, 1897, 385.)

The Leardo Map of 1452 has the east at the top of the map and the south at the right hand of the observer. (Bull. Am. Geog. Soc. XXXVIII, 1906, 366.) These maps were thus oriented because the inhabitants wished to put Jerusalem at the top of the page. The inhabitants of portions of Asia lying east of Jerusalem, if their ideas of the world were based on Jerusalem as the great historical centre of thought, made maps with the west at the top. Peoples living to the south with the same idea would have had the north at the top.

The Arab cartographers placed the south at the top of the page (Santarem, 1849, I, 421); and the Egyptians oriented their maps in the same way, as is proved by a map of the time of Seti I, described in Delegeur's "La cartographie chez les anciens."

There are some early maps of portions of North America with the west at the top. This arrangement probably resulted from the fact that the explorers travelled from the east to the west. They consequently represented what they saw as if they were moving from the east to the west over the land. An example is the sketch map, of Boston Harbor, in 1689, attributed to Captain Cyprian Southake. This map has the names of the islands in the harbor and most of the points of land surrounding the harbor, so that they may be read when holding the map with the west at the top. The title of the map and the large letters BOSTON HARBOUR are printed in the Fitzhugh copy, 1694, to read when holding the north at the top, while the three names Boston, Sentenall hill, and Charles Towne are printed so that the map must be held with the south at the top in order to read them easily.

MAGNETIC NORTH ORIENTATION.—Nordenskjöld (Periplus, 1897, 45-50) says that the use of the compass was known in China 2,000 years before the Christian Era, as there is a record of magnetic cars used at that time. The art was lost and was rediscovered in the third century A. D. In Europe the first record of the use of the compass was about 1200 A. D. Wind-roses placed on maps to show the points of the compass were seldom used before 1500 A. D. After this date, however, their use became common. The first map showing both true and magnetic north was made in 1530.

Where the variation of the compass is slight, magnetic north orientation gives a near approach to the true north orientation. In regions where the variation of the compass is great this method resulted in the production of maps with an approximate northwest or northeast orientaton.

As the fact became known that the compass did not point year after year to exactly the same point, there grew up the idea that some more fixed standard must be used for the orientation of maps.

TRUE NORTH ORIENTATION.—With the evolution of the idea that the earth was approximately a sphere rotating with a comparatively fixed axis pointing nearly to the north star, the present method of orientation of maps was developed, and we have on many old maps the double north point, showing both true and magnetic north.

There seems to have been formerly no uniformity in regard to the use of an arrow with two wings for true north and an arrow with one wing for magnetic north. This method is now generally used by map makers. Thus, on recent maps the true north is shown by an arrow-head with a black wing on each side, and the magnetic north is shown by an arrow with a black wing on one side only, this wing being placed on the side of the line corresponding to the variation of the needle. Thus, if the magnetic needle points to the west of the true north, the black wing will be on the left of the line; on the other hand, if the needle points to the east of the true north, the black wing will be on the right of the line.

DEEDS AND PLANS.—Many deeds and plans, even at the present time, are drawn with no reference to the meridian, or, at least, have the meridian put in apparently as an afterthought. There is a strong tendency among engineers in large cities at the present day to require all deeds and plans to have a true north orientation. This makes it very much easier to compare various deeds and plans. It would, therefore, be a great saving to the business interests of the world if all schools taught geography with maps which were

universally oriented with the central meridian parallel to the right and left hand sides of the page.

MAP REPRESENTATION BY CHILDREN.—The writer has tried in a number of schools the experiment of asking children who have just begun the subject of geography, to draw a portion of the immediate surroundings of the school with which they are personally familiar. In some cases these children have been told where the north and south line lay with reference to the building. In other cases they have been told nothing about orientation. The results of these experiments have been exceedingly interesting, and the author has come to a tentative conclusion in regard to the ideas developed in the child just beginning the study of geography.

Children apparently have no fixed point of orientation which guides them in drawing a map of a known area. They are nearly as likely to put the east or the west at the top as the north. They very seldom place the south at the top. Even when they are told where the north and south line lies in the school room, they are generally unable to draw with correct orientation a map of a few streets which they know intimately. It is necessary to teach them by repeated trial and correction to orient themselves with reference to the mid-day line established by the shadow of a tree, a pole, or the edge of a building.

EDUCATIONAL VALUE OF ORIENTATION.—When children have been well taught to orient themselves with reference to the mid-day line of the school in which they are studying, they show a marked improvement in the percentage of correct orientations in drawing a new map. In all the experiments made by the writer these new maps have been of portions of the immediate neighbourhood of the school with which the children were familiar.

When young children are taught early in their study of geography to orient themselves in their immediate neighbourhood with a true north and south line, and when these children are shown no maps except those which are thus correctly oriented, the writer is of the opinion that the percentage of people who are able to use maps intelligently will be very largely increased.

In our modern life, with its strenuous activities, any method of education which tends to increased efficiency is of high value. A child trained in our modern schools must be able to read quickly the printed page; he must also be able to read and sing musical notes; likewise he should be able to read intelligently and quickly any map which is presented to him for use or study.

LIST OF REFERENCES.

(1) Beazley, C. R. Dawn of Modern Geography. London: J. Murray. III. 1897. References.

(2) Delegeur. La cartographie chez les anciens. Antwerp. 1880.

(3) Fischer, Teobaldo. Fac-simile delle Carte Nautiche & Portolani. Venezia: Ferd. Ongania. I–XVII. 1881.

(4) Miller, Konrad. Die aeltesten Weltkarten. Stuttgart: Jos. Roth. I–VI. 1895–'98. Bibliography.

(5) Nordenskiöld, A. E. Fac-simile Atlas. Stockholm. 1889. Translated by J. A. Ekelöf and C. R. Markham. Reproductions of the most important maps printed in the XV and XVI centuries. U. S. maps not included. Large maps not given, as S. Cabot's planisphere, Mercator's Flandria, etc. References in foot notes.

(6) Nordenskiöld, A. E. Periplus. Stockholm: P. A. Norsted & Söner. 1897. Translated by Francis A. Bather. An essay on the early history of charts and sailing directions. Many references in notes.

(7) Philippi, F. Zur Reconstruction der Weltkarte des Agrippa. Marburg: N. G. Elwert. 1880. Bibliography.

(8) Santarem, M. F. de B. S. Atlas de Mappemondes, etc. Paris: E. Thunot et C°. 1849. VI to XVII century. References.

(9) Santarem, M. F. de B. S. L'histoire de la Cosmographie. Paris: Maulde et Renou. 1849. References in foot notes.

(10) Sommerbrodt, E. Die Ebstorfer Weltkarte. Hannover: Hann. 1891. Atlas with 25 plates—crude representations of men—animal heads—cannibals—land forms so contorted that orientation is almost lost. References.

GEOGRAPHICAL RECORD.

AFRICA.

AFRICAN FORESTS.—Germany has adopted forestry regulations for her Togo colony. The Togo Government recently reported that a large part of the colony covered with forest a century ago has been denuded of its trees till these regions have taken on a steppe-like character, and evaporation has been so largely increased that the dry season reaches the proportions of a drought. Rules for the protection of the remaining forests have therefore been adopted. An area of 112 square miles is to be planted with trees every year and premiums have been offered to plantation companies and missionary societies to encourage the planting of some of the most useful trees:

Mr. Walter Busse in a recent article on the destruction of timber in tropical Africa attributes the practice to the fact that the natives do not fertilize their tilled lands, but abandon them as soon as their productive capacity declines for new lands which they have meanwhile prepared for use. They kill trees on the edge of the forest by girdling them with gashes or stripping off the bark, cut down the dense undergrowth around them and in the dry season set fire to the brush, dead trees as well as the scrub being consumed. The ashes help to produce fine crops and another clearing is begun, in readiness to replace the new farm when it in turn begins to fail.

The deforestation of the country has been enormous wherever the population is dense.. There is abundant evidence, Mr. Busse says, that a vast forest once extended from Sierra Leone to the Equator, most of which has been destroyed by man. One of the colonial Powers has now taken the first steps to change this course of things and to repair some of the damage done.

DEVELOPMENT ON THE ATLANTIC BORDER OF THE SAHARA.—The Governor General of French West Africa, according to *Globus* (Vol. 94, No. 4), is striving to develop the fisheries along the Atlantic coast in the neighbourhood of Cape Blanco. The French harbour of Port Etienne, founded some years ago, is gradually growing and promises much importance, though potable water is obtained only by distillation. The coastal waters are very rich in fish and it is expected that the new fisheries recently established will make a valuable addition to the fish resources of France. One company is already engaged in the business, others are to follow, and Breton fishermen at Port Etienne are making large catches. Good caravan routes extend from this point into the desert to the east, north to Morocco, and south to Senegal.

THE GORGE OF THE ZAMBEZI.—It is now a well-known fact that the Victoria Falls of Rhodesia owe their peculiar character to the action of the water on a series of much-jointed lavas. Less is known about the gorge below the Falls. Accordingly, an article from so able a pen as that of G. W. Lamplugh (Geographical Journal, Vol. xxxi, 1908, pp. 133-152 and 287-303) is especially important. In it he describes in some detail the results of an exploration of a few weeks in the summer of 1905, made at the request of the Council of the British Association. The gorge is described in considerable detail, and also some of the tributaries to it, and there are some excellent photographic views from which the characteristics of the gorge are easily seen. Livingstone ascribed the remarkable zig-zag gorge immediately below the Falls to sudden rending of the earth's crust, but Lamplugh agrees with Molyneux that *it is purely the result of erosion guided* by rectangular joint planes. He says "every part of the cañon that I visited bore out the conclusion that it is a valley of erosion; and I found excellent illustrations . . . . of the mode in which the curious zig-zags are developed, both in the main gorge and in its laterals, through the differential excavation that ensues when vertical planes of weakness traverse the rocks." R. S. T.

AMERICA.

A NEW MAP OF THE UNITED STATES COAL FIELDS.—The U. S. Geological Survey has just published a map in colours, scale about 110 miles to an inch, "Coal Fields of the United States," by Marius R. Campbell. A long explanation of the map and statistical tables fill the margins. In the last few years many new data have been collected, important coal fields have been surveyed and new fields discovered. The new map, therefore, differs much from its predecessors. New coal fields appear, the boundaries of old fields are revised and large areas are shown where the existence of coal has been established, though at present it is not accessible. The qualities of the product of the fields are differentiated by symbols, and the distinction made between the various grades of coal is, from the commercial point of view, the most important feature of the map.

In his explanatory text, Mr. Campbell says it is now known that vast quantities of coal in the western States are deeply buried under sediments, so that little effort to reach the fuel is likely to be made until more accessible beds are exhausted. For the first time, the coal or lignite in the deep river basins of Colorado, Montana, Wyoming, and North Dakota is represented on the map. Mr. Campbell says the fields of Washington are doubtless much larger than the map

indicates, but large parts of them are so covered by glacial gravel and heavy timber that it is impossible, as yet, to discover their volume and extent.

The Geological Survey recognizes these six classes: (1) anthracite, (2) semi-anthracite, (3) semi-bituminous, (4) bituminous, (5) sub-bituminous (black lignite) and (6) lignite. The first four are grouped as high-grade coals and are shown on the map in gray. Sub-bituminous coal is represented by olive green and lignite, the lowest grade, by yellow. The areas are also differentiated according as they contain workable coal beds, may contain them or contain them under such heavy cover as not to be available at present. The limit of workable depth is based on the actual working conditions in Europe, and especially in Belgium, where the limit is fixed at 3,000 feet for coal and 1,000 feet for lignite. The minimum minable thickness of bed is fixed at twenty inches for coal and three feet for lignite.

According to the figures given, the area of the more accessible coal fields in the United States is about 327,000 square miles, and they carry an estimated content, available without excessive cost for future use, of nearly 2,000,000,000 tons. Of course, the rate of consumption cannot be predicted with certainty, but even if it increases at the marvellous rate of the last fifty years, the supply of easily available coal will not be exhausted until the middle of the next century. This is a more cheerful view of the future of our coal industry than is presented in other recent estimates.

Antiquity of Man in America.—*Bulletin* 33 of the Bureau of American Ethnology deals with this question. It comprises the report of Dr. H. Hrdlicka, an accomplished student of human osseous remains, who has made a careful study of the fourteen specimens or groups of specimens found in North America that seemed to indicate the presence of early man. The first of these specimens, the New Orleans bones, were discovered in 1844, and the remains known under the name of the Nebraska loess man were unearthed from 1894 to 1906. Mr. Hrdlicka discusses these finds of human remains, for which geological antiquity has been claimed, in considerable detail.

His general conclusion is that the somatological evidence in each case bears witness against the geological antiquity of the remains and for their close affinity to or identity with those of the modern Indian. Only one idea is justified by these facts and that is that on this continent no human bones of undisputed geological antiquity are known. Early man may have existed in this country, but convincing proof of the fact still remains to be produced. In spite, however, of the repeated failures to obtain satisfactory evidence of man's antiquity in America, there is reason to encourage renewed, patient, and scientifically conducted exploration:

> A satisfactory demonstration of the presence of a geologically ancient man on this continent would form an important link in the history of the American race and of mankind in general. The Missouri and Mississippi drainage areas offer exceptional opportunities for the discovery of this link of humanity, if such really exists.

Mr. Hrdlicka mentions a consideration of far-reaching significance, adding strength to the belief that man's introduction into America must have taken place in a comparatively recent geological period. Man appeared in the Old World, probably during the Tertiary period, through differentiation from the primates, the class of animals to which he presents the closest structural analogies. Primates of the higher forms were not found in America; they existed only in the

warmer parts of Asia, Africa and Europe, and it is there that we must look for the first traces of man's appearance:

> Accepting this view, it follows that America was peopled by immigration from the Old World which could not have taken place until after great multiplication and wide distribution of the human species and the development of some degree of culture. This implies a vastly later date than that assigned to man's origin. A wide dispersion of the race over the earth could hardly have taken place before the later stages of the caenozoic era.

The Report says that in considering the question of the appearance of man in America, special interest attaches to the Pleistocene, during several phases of which period man is known to have existed in central and western Europe; there is absolutely no indication that he reached the American continent before that time.

GEOGRAPHICAL INFLUENCE IN THE DEVELOPMENT OF NEW JERSEY.—In the *Journal of Geography* (Vol. VI, 1908, pp. 177-182) Mr. R. H. Whitbeck has given us a clear-cut statement of the geographic factors involved in the development of New Jersey. He points out that a single dominant factor lies at the base of the industrial development of certain sections, *e. g.*, mineral wealth in Pennsylvania, water-power in New England, and a natural waterway in New York. These States depend upon something within their own confines, whereas New Jersey is dependent upon influences operating from outside. It has little mineral, little water-power, little good soil, and a coast line of little value in commerce. Yet New Jersey ranks as one of our foremost industrial States. Although ranking forty-third in area, it ranks sixth in manufacturing, second in *per capita* value of manufacture, and easily first in percentage increase of manufacturing between 1890 and 1900. Land of little value for farming sells at $1,000 an acre, and swamp lands a short time ago valued at no more than five dollars an acre now sell for $5,000 an acre. Side by side are the people who have eked out a scanty existence on sandy or rocky soil, and wealthy city people who make the poorest of land the seat of their magnificent country homes. The coast line presents the same contrast of the shanties of the Baymen, until recently isolated, and the homes of the wealthy city folk side by side.

Mr. Whitbeck shows very clearly that this condition is the result of *"the influence of geographical position"* between the great cities of New York and Philadelphia. He concludes his most interesting and valuable paper in the following words: "Whether we consider the State's development in agriculture, in transportation, in manufacturing, in the value of real estate, in the growth of sea-side resorts, in the range of prices or of salaries, we find the same dominant influence everywhere. The material growth of the State finds its stimulus not primarily in its own resources, *but in its geographical position* between two great States, two great cities, two great harbours, whereby it shares in the prosperity, the wealth, and the opportunities of both." R. S. T.

WATERS OF THE GREAT LAKES.—About two years ago, the U. S. Geological Survey, began a study of the waters of the Great Lakes. For a year samples were collected each month from each lake at a point where the water would probably represent the normal quality of the discharge. The waters were shipped to the water-testing laboratory of the Survey at Washington, where they were analyzed.

The Lake Superior water was found to be least strongly mineralized. Lake

Michigan is twice as high in total solids, and Lake Huron is but little less mineralized than Lake Michigan. Lakes Erie and Ontario are practically alike in mineral content, holding about 2½ times as much solids in solution as Lake Superior. Reason for the striking difference in the lake waters is found in the character of the geologic formations in the drainage basins tributary to them. The crystalline and igneous rocks—granite, schist, gneiss, and basalt—that predominate all around Lake Superior are not easily soluble, and hence the lake receives few affluents bearing large quantities of dissolved matter; Lake Michigan and Lake Huron, on the other hand, receive drainage from limestones and sandstones of the sedimentary series and contain a much greater proportion of mineral matter. Dilution by the softer water of Lake Superior probably accounts for the fact that Lake Huron water is less mineralized than that of Lake Michigan. It is probable that forestation, sedimentation, and relation of rainfall to run-off also affect the relative composition of the lake waters.

Mr. R. B. Dole, under whose direction the analyses were made, says that the lakes are almost invariably softer than their affluents. The reason is apparent; as the lake surfaces are large in proportion to their corresponding land drainages, a great part of the rain falls directly into the lake waters and dilutes them; on the other hand, rain falling upon the land becomes more or less impregnated with mineral salts before it reaches the lakes in the normal run-off.

A study of all the data leads to the conclusion that the lake waters may be especially recommended for industrial and domestic uses wherever they can be economically obtained. They are low in mineral content and normally free from turbidity.

THE GEOLOGICAL SURVEY OF OHIO is accomplishing several things which will be of interest and advantage to geographers. The geologic map is to be revised and re-issued. The last edition is a small map in Volume VII, dated 1893. The new map will show, in addition to data on former maps, the outcrop of the Pittsburg coal in Ohio, which was mapped in the summer of 1907 by the Director and assistants, the contact of the Lorraine and Richmond formations of the Lower Silurian now being mapped by A. Foerste and assistant, and a number of minor additions and corrections.

A series of educational bulletins is outlined and three numbers are in preparation. One is a Preliminary Report on the Physiography of Ohio, consisting of a description and discussion of the physical features of the State, prepared by George D. Hubbard; another discusses the geologic, glacial, shore-line and stream-made features of the Cleveland district, by F. Carney, F. Van Horn, and H. P. Cushing; the third will deal with the geology, resources, and physiography of the Columbus region, prepared by the Director J. A. Bownocker, C. S. Prosser, G. D. Hubbard, and assistants. The last two of these bulletins will be issued before the general discussion. All are being prepared with the needs of college and secondary teachers and students in mind, and will, it is hoped, prove of considerable value in these schools of the State, as well as to the general reader in the localities covered.

Bulletin IX on the coals of some southeastern counties of the State is now in the hands of the printer. This gives many sections and valuable data concerning the coal deposits in this portion of Ohio. G. D. H.

EDUCATIONAL BULLETIN OF THE ILLINOIS GEOLOGICAL SURVEY.—State geological

surveys began their work largely along stratigraphical lines, as was natural, since stratigraphy was basal in importance. From this the transition to Paleontology was a simple step, and in the early days especially, these two aspects of geology practically monopolized the energies of the staff of the surveys. With the development of our mineral resources State geological surveys naturally undertook to occupy this field. As a result of this history these surveys have allowed other fields of activity to be untouched. The soil, one of the most important of the geological phenomena, has been so completely neglected that its study has passed to other divisions than that of geology, where it belongs. There has been neglect along other lines also, and among these is the field of popular education. Surely it belongs in the province of the State geological surveys to provide information for the schools and the intelligent citizens, as well as for the mining population. There has not been a broad policy in the management of most State geological surveys, otherwise such opportunities would not have been missed. It is, therefore, peculiarly gratifying to see a State geological survey which is at last making provision not merely for pure geological research, paleontology, and economic geology, but also for other phases. This the Geological Survey of Illinois is doing. In educational lines it is making specific provision for educational bulletins, and has a consulting geologist, Prof. R. D. Salisbury, in charge of their preparation. In this way the Illinois Survey is going to perform a service to the State and should set an example to other Surveys.

The first of the Educational Bulletins, number 7 of the general series of Bulletins, has recently been published. It deals with the physical geography of the Evanston region and is thus of interest to the teachers, students and intelligent citizens of a large area, the seat of two important educational centres. The authors, W. M. Atwood of Chicago University and J. W. Goldthwaite of Northwestern University, have presented a first hand discussion of a physiographic region which will be of interest to physiographers of the country as well as to local students. The bulletin is a model, and reflects credit upon those who prepared it, as well as upon the wise policy of the Survey. Would that the people of New York could find some similar work on, let us say, the Hudson River, or Lake George, or the Mohawk Valley, or some of the other interesting parts of the State. R. S. T.

THE OKLAHOMA GEOLOGICAL SURVEY.—The constitution of this new State made it obligatory upon the Legislature to establish a Geological Survey. The first State Legislature placed the Survey under the control of a Commission consisting of the Governor, the State Superintendent of Public Instruction, and the President of the State University. The sum of $15,000 was appropriated for the work. The Commission met on July 25, and elected as Director Dr. Charles N. Gould, head of the Department of Geology, at the State University of Oklahoma. He was instructed to report as soon as possible on the building stone, road material, and oil and gas of the State. Parties are now in the field investigating these resources.

EVOLUTION OF NIAGARA FALLS.—In his review of Dr. J. W. Spencer's monograph "The Falls of Niagara" (*Science*, No. 709), Dr. G. K. Gilbert does not share Spencer's view that the age of Niagara, or the time that has elapsed between the beginning of the cataract at the cliff near Queenston and Lewiston and

the present stage of excavation of the gorge, is about 39,000 years. Dr. Gilbert, after comparing the energy of Niagara with the energy of man-made engines, with river work in carrying detritus, and also contrasting the Canadian Fall with the American, suggests that the efficiency of the Niagara engine producing erosion and recession, instead of being constant, increases with the increase of energy and decreases with the diminution of energy. If the true law were known, its application would probably enlarge the time estimate.

He says that "the Niagara problem resembles other scientific problems in that the enlargement of knowledge leads to the recognition of complexity. It differs from many geologic problems in the great extent of its available data. In all the regions covered by the lakes with whose changes it is concerned, those changes were the latest geologic events, so that their evidences overlie all earlier records. They may not be so plain that 'he who runs may read,' but they are so clear and full that the patient observer can bring together a complete, coherent, demonstrative body of data. As the facts are gradually assembled and interpreted an intricate history is developed, a history interwoven on one side with that of the oscillating and waning ice-sheet, and on the other with that of Niagara. The complete correlation of Niagara and the establishment of its chronology promise not only to tell us its age, but to give fairly definite dates to various events in the later Pleistocene history of eastern North America, and to assist the imagination in its broader conceptions of geologic time."

Some of Our Mineral Products in 1907.—An advance chapter from "Mineral Resources of the United States, 1907," says that the iron ore produced in this country in that year amounted to 51,720,619 long tons, valued at $131,996,147 at the mines. As compared with 1906, the most productive previous year, this was an increase of 8.32 per cent. in tonnage and of 31.21 per cent. in value.

The total production of petroleum amounted to 166,095,335 barrels, an increase of 39,601,399 barrels over the production of 1906, the increase being greater than the total production of petroleum in any year up to 1889. The total value was $120,106,749. The Kansas and Oklahoma field took the first place, California the second, and Illinois the third. The greatest change was in Illinois, where 4,397,050 barrels were produced in 1906 and 24,281,973 barrels in 1907.

The smelter production of copper was 868,996,491 pounds, a decrease of 48,809,191 pounds from 1906.

The salt production amounted to 29,704,128 barrels of 280 pounds, valued at $7,439,551, or $781,201 more than the value of the 1906 output. The country exported nearly 62,000,000 pounds of salt.

Change in the Bulletin of the Bureau of American Republics.—Beginning in July last the Bulletin will hereafter be published in two sections; one completely in English and the other having Spanish, Portuguese and French subdivisions. Heretofore the Bulletin has given nearly one-half of its space under the same cover to duplications in those languages of what also appeared in English.

A Library in Washington.—Errors in appreciation are sometimes of geographical origin. This seems to be the case with a note in the *Literary Gossip*

of the London *Athenæum* of August 29, on the death of Mr. Ainsworth Rand Spofford. The *Athenæum* says that Mr. Spofford

obtained a post in the Congregational Library at Washington, of which he was chairman from 1864 to 1897.

What is the Congregational Library at Washington and what is the chairman of a library? Mr. Spofford was for many years the librarian-in-chief of the Library of Congress, sometimes called the Congressional Library; but the *Athenæum* knows the difference between *congressional* and *congregational* and may be able to explain what is meant by the chairman of a library.

THE BOUNDARY BETWEEN COLOMBIA AND BRAZIL.—The fourth clause in the Boundary Treaty of 1907 between these two nations has now gone into effect. It gives to each of them the fullest reciprocal liberty to navigate the international rivers and carry their commerce across the new frontier between them. Colombia will be the larger beneficiary by this arrangement because it gives her open waterways by the large Guainia-Rio Negro and Uaupés-Rio Negro affluents to the Amazon and the Atlantic.

The boundary settlement was an agreement upon a scientific frontier following chiefly water courses and water partings in a wholly undeveloped region, so little known that the boundary claimed by each country was chiefly on paper. Not quite all of the boundary is now defined, as a short stretch of it must await for its determination the settlement of the dispute between Colombia and Ecuador.

Geography profits by the studies that have led up to these amicable arrangements. A new map replaces the old hypothetical tracings of the western affluents of the Rio Negro with the real facts. The waterways that constitute the important basin of the Rio Apoporis are mapped for the first time. Commerce and development will gain, because both nations have agreed to co-operate in the improvement of the rivers crossing their border and have made a special convention concerning the navigation of the Putumayo, the second largest of the Amazon's northern tributaries.

ASIA.

MINERAL RESOURCES OF THE PHILIPPINE ISLANDS.—The Bureau of Science, Manila, has published a *Bulletin* by Warren D. Smith, Chief of the Division of Geology and Mines, and members of the staff, on the mineral resources of the islands and their product in 1907. It is believed that a sure, profitable, and steady mining industry may in time be built up in the colony, but this report shows that little more than a beginning has yet been made. Coal has been found in nearly every island of the archipelago, but only 4,545 tons were produced last year. In many places it is associated with petroleum. The coal is pretty much alike throughout the islands, is sub-bituminous, and has the appearance and specific gravity of lignite, with the carbon content and streak of a bituminous coal. The promising coal fields at the present time are in Cebú; the island of Polillo near the east coast of Luzon, about opposite Manila; the southern part of Mindoro and on a small island south of it; Batan island; the northern part of Dinagat Island, Mindanao; and in the northeast corner of Negros.

Petroleum occurs on the east coast of Tayabas province and on the west coast of Cebú. There are hundreds of square miles of excellent limestone with shale

and clay beds, the raw material for cement. Much more lime than is now produced can be made. The quality of the marble in use leaves much to be desired, and as yet there is no good building stone in the Manila market.

In 1907, the amount of gold mined was 4,540 ounces, and up to June of that year, 1,601 lode claims, and 533 placer claims had been filed. Silver is as yet practically a negligible quantity (83 ounces mined in 1907). All the iron yet produced comes from one furnace (436 short tons last year), and the methods are very crude. A map showing the principal mineral districts accompanies the report.

THE PHILIPPINE AGRICULTURAL REVIEW.—This is a new publication of the Bureau of Agriculture for the Philippine Islands. It is issued monthly and is intended to be a popular publication on general agriculture, with reports on agricultural conditions in different parts of the archipelago and articles on tropical agriculture. It is circulated free in the Philippines.

THE BATANES ISLANDS.—The *Philippine Journal of Science* (Vol. 3, No. 1) contains an article on the Batanes Islands by Henry G. Ferguson, dealing especially with their physiographical aspects. The paper is illustrated with maps and photographs. Mr. Ferguson does not follow the spelling of the War Department Gazetteer.

These islands form the most northern portion of the Philippines. They consist of the islands of Isbayat, Batan, Sabtan, and Ibujos, all of which are inhabited, and the uninhabited islands of Y'Ami, Maysanga, Mabudis, Siayan, Inem, and Desquey. Y'Ami, the most northern island, is about 270 kilometers from the nearest point of Luzon, and 160 kilometers from the southern point of Formosa.

The natives form a separate race, speaking their own language or languages, for that of Isbayat is different from the language of the other islands. Professor Scheerer considers the inhabitants of Batan and Sabtan to be of Malay stock, while those of Isbayat are mixed Malayan and Papuan. They are kindly, intelligent, enterprising, and extremely industrious. The two principal islands, Batan and Sabtan, are over-populated, and the arable land is largely taken up, hence there has been considerable emigration and the Batanes people are scattered throughout the Babuyanes islands and Luzon. Before the Spanish occupation the constant warfare between villages made defense the first requisite in the choice of the village site, hence the inhabitants lived on the hill tops, going down to work in the fields by day. With the coming of the Spaniards the hill towns were destroyed and the people moved into sea-coast villages.

The geological structure, upon which the topography of the islands is largely dependent, brings the Batanes into three groups:

1. Islands consisting in great part of the older rocks, volcanic agglomerate with basic dikes. To this group belong Sabtan and the southern part of Batan.

2. The younger volcanic group consisting of Mount Iraya in Batan, the island of Inem and the small islands to the north of Isbayat.

3. The coral limestone group, Desquey, Ibujos and probably Isbayat.

In pre-Miocene times a land mass of considerable extent was built up by enormous explosive eruptions from unknown sources and after the cessation of these explosions was gradually worn down by streams to an extremely mature topography.

The next stage from the Miocene to recent times was one of predominant uplift, limestone containing Miocene fossils being found at elevations up to 275 meters. This period was marked by renewed activity of the streams and the cutting of steep cañons. The *locus* of volcanic activity is now shifted from the region of Sabtan to a line along the 122d meridian.

Faulting between Ibujos and Sabtan cut off part of the old upland, leaving a well-marked fault scarp along the west coast of Sabtan and growth of coral and later elevation brought a limestone mass, of which the islands of Isbayat, Ibujos, and Desquey are remnants, to the surface. The large number of earthquakes in the Batanes indicate that movement along this fault is still going on.

The recent history of the islands is mainly one of lessening of the area. Nothing is being gained through uplift. The growth of coral reefs is the only force acting in opposition to the erosive action of waves, streams, and tides. The work of man in deforesting the ridges is assisting in the wearing down of the land.

THE HANGCHOW BORE.—A very interesting and well-illustrated description of the phenomena associated with the remarkable bore on the funnel-shaped Hang-Chau Bay and the estuary of Tsien Tang Kiang River in China is presented by Dr. Charles K. Edmunds in recent numbers of the *Popular Science Monthly* (Vol. LXXII, 1908, pp. 97-115 and 224-243). The bore rushes up this bay and estuary as a result of the retardation of the tidal rise in the outer portion, causing such a difference in water level in a short distance that a breaking wave is formed at every incoming tide. At its maximum the bore which rushes past Haining is a solid wall of water from two and a half to three miles wide, from ten to twenty feet high and moving at a velocity of from ten to twenty miles an hour. Something like 1,750,000 tons of water are estimated to pass this point in a single minute. Dr. Edmunds' description of the passage of the bore as actually witnessed by him is most vivid, and his photographs clearly show that his word picture is not exaggerated.

Great sea walls have been built along the banks of the bay and estuary. These, begun about 915 A. D., extend for a distance of 180 miles and are among the marvels of ancient Chinese engineering. The construction of this wall, which is very ingenious, is described and fully illustrated by photographs. It effectually protects the banks from the powerful wash of the bore wave, but itself requires constant care and expenditure to keep it from destruction. The bore is naturally a great menace to navigation and quite effectually interferes with steam navigation; but the Chinese junks navigate the bay and estuary in the following ingenious way: Before the coming of the bore they take shelter at some point where the force of the wave is not great, as, for example, at Bore Shelter Bay, protected from the advancing bore wave by a projecting point. As soon as the bore has passed, the tide rises swiftly and a rapid current sets up the bay. On this "after-rush" the junks run swiftly up stream "with all sails set, but with their bows in every direction." As soon as they can get a little steerage way they make for the sea wall and there find a resting place on a platform behind a buttress of brush and piles. There, with the falling tide, they remain stranded until the next bore passes, the wave itself beating violently against the wall below them, and even sending spray over them, but doing no damage. Then comes the after-rush by which they may be safely floated off. It is an interesting and unique instance of the battle of man with his environment, and the conquering of nature in the service of man. R. S. T.

EUROPE.

GRÉPON AGAIN ASCENDED.—Messrs. Otto Reicher, F. Genecand, and F. Monnier (*Natur und Kunst*, June 1 and 15), with three Swiss guides, have recently ascended the Aiguille du Grépon, which has been regarded as one of the most difficult climbs in the Alps. This great square block, with precipitous sides and minaretted tops, is in view on the usual route up the Mer de Glace to Mont Blanc. Its topmost rock is only 11,445 feet above the sea. Above its general rock mass are towers of granite, parts of which are smooth to the touch and offer no hold or grip of any sort. There are cracks in them a few inches wide, but the cracks are likely to have edges as smooth and true as though a stonecutter had hewn them. The result is that the history of the successful ascents of Grépon is very short. Mummery led the way in 1881, and in his four ascents (the last in 1892) he stood on all the more prominent elevations. Miss Bristow, one of the most skillful of women mountaineers, accompanied him on his last ascent. The Frenchman Dunod followed Mummery in 1885. The Austrian and French climbers who are the last to triumph over Grépon are of the same opinion as their predecessors, that the mountain is one of unusual difficulty. The photographs accompanying the paper show graphically the kind of climbing that is required to get to the summits of Grépon.

JAHRBUCH DES SCHWEIZER ALPENCLUB.—Vol. XLIII (1907) maintains the well-earned reputation of this annual. A considerable number of articles are in French, though most of the volume of 549 large octavo pages is written in German. The volume is supplemented by two fine maps (see *New Maps*), a number of beautiful panoramas, plans of new mountaineering huts, and a well-illustrated monograph by Dr. G. Bossard "Schweizer Zinnkannenen," which shows how artistically the Swiss employ one of the humblest but most useful of metals in their manufactures, and also justifies the idea of the editor, Dr. H. Dübi, that themes relating to the culture of Alpine peoples may not inappropriately appear in the *Jahrbuch*.

A number of recent Alpine journeys are described by various writers, and the editor has an interesting section on new journeys in the Swiss Alps, where many ascents have been made by variations from usual routes. The most valuable scientific feature of the volume is the 28th Report (1907) on the periodical variation of the glaciers in the Swiss Alps by Dr. Forel, Prof. Mercanton of Lausanne, Mr. Muret, chief Forestry Inspector, and Mr. Argand, the geologist.

The list of accidents in the Swiss Alps during the year shows that 62 persons, distributed among 55 climbing parties, lost their lives. Rock falls, fog, avalanches, and hail and snow storms were responsible for 15 deaths. The causes of 8 fatalities are not explained. Most of the casualties were due to failure to use ropes, slipping, exhaustion, cold, attempt to make short cuts, new-fallen snow, and inexperience. Five women were among the victims and 17 were young persons scarcely twenty years old. All were tourists, no guide being involved. Seventeen were out on the mountains merely to gather Edelweiss and other flowers.

The reviews of new Alpine publications fill 150 pp., and the volume closes with the Annual Proceedings of the Club and its sections and the financial report. The illustrations include, besides the folded panoramas, 131 half-tones, many of them full-page, which rank among the best specimens of Alpine photography.

AN ALPINE SECTION IN A WOMAN'S CLUB.—The Lyceum Club, one of the women's clubs in London, with a house in Piccadilly, has added an Alpine section to the social, literary, and other interests represented in its membership. The new section has been ushered in with a good list of members, a banquet, and a letter from Margherita, the Dowager Queen of Italy, expressing her warmest wishes for the success of this section. Its President is Mrs. Aubrey Le Blond, a distinguished mountain climber and the author of several books on the Alps.

POLAR.

THE DENMARK GREENLAND EXPEDITION.—In 1906, the Danish Government and private citizens contributed the funds necessary to fit out an expedition to east Greenland under the leadership of Mr. L. Mylius Erichsen. The party sailed from Copenhagen on June 29th of that year. A telegram received about the middle of August from Lieutenant Trolle, master of the *Denmark*, the vessel of the expedition, announced the return of the party to Bergen, Norway, having carried out its main purposes, although this result was dearly paid for. The leader of the expedition and two companions met their death on the Greenland ice cap near the east coast.

On the journey north a harbour for the ship was found in latitude 76° 45′. A sledge party was organized in the spring of 1907 under the command of Mr. Erichsen to explore the unknown part of the northeast coast of Greenland. The expedition consisted of ten sledges in four detachments. Three of these returned before the beginning of summer, and in September, 1907, an expedition was sent out to find the fourth party, which had not come back to the ship. The search was fruitless, but in March of this year a fresh search party brought definite news of the fate of the missing men.

Mr. Erichsen, Lieutenant Hagen and Mr. Brönlund had remained on the north coast of Greenland through the summer, as the state of the weather made sledging back to the ship very difficult. The last rescue party found the body of Mr. Brönlund in a crevice near one of the supply dépôts in about latitude 79° north. By the side of the body were found sketches showing the results of the work accomplished and also the dead man's diary, in which was written the following:

> I am dying in latitude 79° north under the hardships of the return journey over the inland ice in November. I reached this place under a waning moon and cannot go on because of my frozen feet and the darkness. The bodies of the others are in the middle of the fiord. Hagen died on Nov. 15, Mylius Erichsen some ten days later.—JORGEN BRÖNLUND.

Mr. Brönlund's body was buried on the spot where it was found. Lieutenant Trolle says in his telegram: "It was impossible to recover the bodies of the others owing to the heavy fall of snow. We erected a monument at Over Haven, Port Denmark, to the memory of our three dead comrades who perished in doing their duty on the field of honour. Everything possible was done to succor them from the ship, but it was beyond human power to prevent the catastrophe."

The death of Erichsen and his two comrades will be deplored by all who know of the excellent purposes of this expedition and of the good work it achieved. The entire unknown coast of Greenland was carefully explored, and the researches were continued along the north coast as far west as Cape Bridgman, discovered and named by Peary, in lat. 83° 30′. The party saw Peary Channel, which separates Greenland from the archipelago north of it, but the

preliminary report does not show that they entered far into the channel. The coast line was found to take a much more easterly direction than was expected. Connection was made with Peary's landmark on Peary Land and at Cape Glacier, at the eastern end of Peary Channel, the Danish flag was hoisted and the country was taken possession of for Denmark and called King Frederic VIII Land.

One of the purposes of the party was to look for Eskimo remains. The telegram does not report whether any were found, but says that no living people were encountered. At 80° the expedition found open sea close to the coast. In the fall of 1907 and the spring of this year several sledge journeys were made on the inland ice, some of them towards the south as far as Ardencaple Inlet. Scientific expeditions were continuously made into the district surrounding Port Denmark and also from the ship. Large collections were made, including a mass of scientific data and numerous sketches, paintings, and photographs of the country were also made.

The expedition consisted of twenty-seven members, including several men of science and a painter. It was provided with motor boats in addition to the ordinary equipment of Arctic exploration. While Erichsen's main object was to map the unknown part of northeast Greenland, he hoped also to collect a mass of valuable material for the study of ethnological, biological, and even seismological questions.

Erichsen had already made an honourable record in Arctic exploration. During the expedition which occupied him from June, 1902, to November, 1904, he succeeded in making a chart of the hitherto almost unknown shore line of Melville Bay. His latest work nearly completes the outlining of the coasts of Greenland. He was especially interested in efforts to discover by what routes and in what period the Eskimos had made their way into Greenland.

Departure of the Charcot Expedition.—The French Expedition to the Antarctic under the command of Dr. François Charcot left Havre on August 15 in the *Pourquoi Pas,* a vessel especially built for the explorer's purposes. Some 30,000 persons were on the wharves to bid the expedition God-speed. The French Parliament had made a grant of $160,000 for the expedition, and the Prince of Monaco, the Paris Geographical Society, and other scientific bodies contributed to an important extent in the organization and equipment of the party.

Dr. Charcot expects to be absent about two years. His vessel is 41 metres long, 9.20 metres broad, and has a tonnage of 800. She was built to withstand great ice pressure. He will make his winter quarters on that part of the Antarctic continent which most nearly approaches South America, at Port Charcot, where he spent the winter of 1903, about 500 miles south of Cape Horn. He hopes next year to go on to Loubet Land to begin his exploration of the regions to the south.

His scientific staff includes Mr. Bougrain, who will make the astronomical observations; Mr. Rouch, specialist in meteorology, and oceanography; Mr. Godefroy, who will study the hydrography of the coast and the tides; Mr. Gourdon, geologist; and Dr. Jacques Liouville, marine zoologist and botanist. Six automobile sleds will, it is hoped, enable the expedition to make its way well into the interior along the glaciers and supplement the services rendered by the skis. If practicable, Dr. Charcot intends to travel to the south pole, or as near as possible, but this is by no means the main purpose of his expedition. One

of his objects is to bring back specimens of the fossils in Graham Land to which Dr. Nordenskiöld has already called attention.

MORE DETAILS OF COMMANDER PEARY'S PLANS.—Commander Peary wrote to Dr. H. F. Osborn, President of the American Museum of Natural History, from Sydney, Cape Breton, on July 16, that he was leaving Sydney on that day and hoped to reach Cape York about August 1. Outlining his further plans he said:

For some ten days I shall be occupied in the region from Cape York (76 degrees north latitude) to Etah (about 79 degrees north latitude), taking on board my Eskimos with their dogs, and hunting walrus for my meat supply.

About the middle of August, after replenishing the coal supply of the *Roosevelt* from the auxiliary steamer *Erik*, and putting down a coal depot at Etah, the *Roosevelt* will part company with the *Erik*, turning south for home.

I shall then endeavor to force the *Roosevelt* through Kane Basin, Kennedy Channel and Robeson Channel, to winter quarters at Cape Sheridan on the north coast of Grant Land. I hope to get my ship to Cape Sheridan not later than September 15.

Early in February, 1909, I shall leave the ship with dogs and sledges, in the effort to reach the Pole across the ice of the central Polar Sea.

Returning I shall probably come down upon the northern coast of Greenland, and follow that coast back to the *Roosevelt*, which should be reached about the end of June, 1909.

If the sledging journey has been successful the *Roosevelt* will then force her way south the latter part of July, and I shall hope to get in touch with the world again in September or October of 1909

Should the effort of the spring of 1909 prove unsuccessful, I have supplies and equipment with which to remain another year, and make a second attempt in February, 1910.

Details of the movements of the expedition (as far as the imperfect communication of the North will permit) can be obtained from Mr. H. L. Bridgman, secretary and treasurer of the Peary Arctic Club.

VARIOUS.

THE GEOGRAPHEN-KALENDER FOR 1908.—The latest edition of this annual (807 pp.) opens with a biographical sketch in German and French of Dr. Hermann Wagner, the renowned Professor of geography at the University of Göttingen, written by Prof. Wilhelm Sievers and accompanied by a portrait.

Thirty-six coloured maps illustrate the sections *Geographische Chronik* and *Geograph. Forschungsreisen.* The references on the map margins to the text relating to the maps is a convenience first appearing in the present issue. The notices of the geographical literature of 1907 fill 88 pp., the list of new maps and atlases 22 pp., obituary notices 25 pp., list of professorships and societies relating to geography and kindred sciences 254 pp., and of geographical and related periodicals 57 pp. The indexes are copious.

SCIENTIFIC KITE FLIGHTS.—Mr. Cleveland Abbe, Jr., writes to *Science* (No. 711) that on October 3, 1907, one of the international dates for scientific kite flights, the Weather Bureau observers at Mount Weather, Va., succeeded in raising a meteorograph to an altitude of 23,110 feet above mean sea level by means of kites. At that altitude the wind was WNW, the temperature -5.4° F. For the flight 37,300 feet of piano wire were used and the number of kites required to lift were eight, having a total lifting surface of 505 square feet.

STUDYING THE UPPER AIR ON THE VICTORIA NYANZA.—Early in July Professor Berson reached Dar-es-Salaam, on his way to Victoria Nyanza to engage in kite-flying and sending aloft *ballons sondes.* The International Commission, of which

Professor Hergesell is President, had planned to make similar researches at Spitzbergen, Sicily, Zanzibar, and the Seychelles, between July 27 and August 1. Prof. Berson informed the *Deutsch-Ostafrikanische Zeitung* that his work would begin on those days and continue for about three months. As it would be almost impossible to recover ballons sondes in a tropical wilderness, the work would be carried on from the deck of a steamer which had been placed at his disposal. The rubber balloons with self-registering instruments would be released while on the lake far from land very early in the morning. He believed that most of the balloons would be recovered as they dropped to the water. This is the first time that an effort has been made to study the conditions of the upper air in tropical latitudes of the far interior of the continents.

NEW MAPS.

AFRICA.

AFRICA.—Gliederung Afrikas nach physikalischen und wirtschaftlichen Gesichtspunkte. Scale, 1:60,000,000 or 946.9 statute miles to an inch. (7 Maps of the Continent.) Von Siegfried Passarge. *Petermanns Mitt.*, No. 7, Gotha, 1908.

Supplements a paper in *Pet. Mitt.* (Vol. 54, Nos. 7 and 8) by Prof. Dr. Passarge: "Die natürliche Landschaften Afrikas." The maps are: 1. Geologische Gliederung, 2. Orographische Karte, 3. Orographisch-morphologische Gliederung, 4. Die Abdachungen und Abflussverhältnisse, 5. Vegetation und Verwitterung, 6. Natürliche Landschaften, 7. Wirtschaftsformen.

ALGERIA.—Le Chemin de Fer de Tlemcen à la Frontière Marocaine. Scale, 3.3 statute miles to an inch. *Bull. Com. de l'Afrique française,* Vol. 18, No. 6, Paris, 1908.

Shows the Western part of the railroad from Oran to the Eastern border of Morocco, with a profile of the line from Tlemcen to the frontier.

GABOON.—Carte du Nord du Gabon. Parts 1 and 2. Scale, 15.5 statute miles to an inch. *Renseignements Coloniaux,* No. 6, Paris, 1908.

Supplements a paper: "Le Cercle de la Côte Nord au Gabon," by Lieut. Poupard and Mr. Bret. A sketch map in black and white showing itineraries, aneroid altitudes and many place names. Based upon astronomically determined points, it supplies much new material for the maps.

FRENCH CONGO.—Itinéraires de la Mission du Haut Logone 1906-1907. Scale, 65 statute miles to an inch. *Renseignements Col.,* No. 6, Paris, 1908.

A black and white sketch map showing itineraries and points astronomically fixed by the Mission of the upper Logone.

SAHARA.—Bassin de l'Igharghar et Itinéraires au Sud du Ahaggar. Scale,

1:250,000 or 3.95 statute miles to an inch. By Lieut. Voinot. *Renseignements Col.*, No. 4, Paris, 1908.

Supplements a paper: "Reconnaissance du Bassin Supérieur de l'Igharghar." The work was done in the winter of 1905-1906.

GERMAN EAST AFRICA.—Deutsch-Ostafrika. Scale 1:5,000,000 or 78.9 statute miles to an inch. *Bull.* de la Soc. Belge d'Études Coloniales, No. 4, Brussels, 1908.

Taken from the book "Wie erschliessen wir unsere Kolonien," published by the "Deutsche Kolonialgesellschaft." Shows railroads completed and projected, and principal highways, and distinguishes the chief places in the military and colonial districts.

CAMEROONS.—Kamerun. Scale, 1:7,500,000 or 118.35 statute miles to an inch. *Deutsche Rundschau f. Geog. u. Stat.*, Vol. 30, No. 11, Vienna, 1908.

Shows the old boundary between German and French territory and the new boundary according to the treaty of April 18, 1908.

GOLD COAST.—Gold Coast. Scale, 1:125,000 or 1.9 statute mile to an inch. Sheets, 72-I-II (Debiso), 72-I-IV (Dadiaso), 72-J-III (Asafo), 72-J-IV (Wiawoso), 72-O-II (Yaou), 72-O-IV (Newtown), 72-P-I (Enchi), and 72-P-III and 72-V-1 (Tanoso & Beyin). Published under the direction of Major F. G. Guggisberg, R.E., Director of Surveys, London, 1908. Selling agents W. & A. K. Johnston, Edinburgh and London, and Edward Stanford, London. (Price, 2s. a sheet.)

MADAGASCAR.—Les Voies de Communication à Madagascar. *Les Colonies françaises*, Marseille, 1908.

A sketch map showing wagon roads, mule and native paths, railroads, and canals completed or building, and length of navigation in rivers.

AMERICA.

U. S. GEOLOGICAL SURVEY MAPS.

UNITED STATES.—Coal Fields of the United States. Scale, about 110 statute miles to an inch. By Marius R. Campbell. Edition of May, 1908. Washington, 1908. (Price, 10 cents.)

Described on page 543 *Bulletin Amer. Geog. Soc.*, Sept., 1908.

UNITED STATES.—Geologic Map and Sections of Iron Springs Quadrangle, Utah. Scale, 1:62,500 or 0.9 statute mile to an inch. Contour interval, 50 feet. Washington, 1907.

Illustrates Bulletin 338, "The Iron Ores of the Iron Springs District, Southern Utah," by C. K. Leith and E. C. Harder.

UNITED STATES.—Geologic Sketch Map of Northeastern Oklahoma. Scale, about 9 miles to the inch. *Bull.* 340, Washington, 1908.

Supplements a paper: "Mineral Resources of Northeastern Oklahoma," by C. E. Siebenthal, in "Contributions to Economic Geology, 1907." The area

covered is 83 miles E. and W. and 104 miles N. and S. Shows the sandstone and limestone formations, oil and gas fields, coal, coal works, lead and zinc mines and sandstone quarries.

UNITED STATES.—Map of Central Part of Colorado Showing Location of Copper Deposits in Chaffee, Fremont, and Jefferson Counties. Scale, 18 miles to an i..ch. *Bull.* 340, Washington, 1908.

The copper deposits are indicated only by the place names referred to in the accompanying text.

UNITED STATES.—Map of Flushing Quadrangle, Ohio. Showing Contours on Top of Berea Sand. Scale, 1:62,500 or 0.9 statute mile to an inch. *Bull.* 346, Washington, 1908.

Red contours show the top of the Berea oil sand from datum 2,000 feet below sea level. The distribution of producing oil and gas wells is shown.

UNITED STATES.—Geologic Map and Sections of the Cœur d'Alene District, Idaho. Scale, 1:62,500 or 0.9 statute mile to an inch. Washington, 1908.

Supplements Professional Paper 62: "The Geology and Ore Departments of the Cœur d'Alene District, Idaho," by Frederick Leslie Ransome and Frank Cathcart Calkins.

UNITED STATES.—Map of Rampart Placer Region, Alaska. Scale, 5 statute miles to an inch. *Bull.* No. 337. Washington, 1908.

Shows in colours gravels known to be gold bearing, productive gold-bearing gravels, and trails.

UNITED STATES.—Reconnaissance Map of the Fairbanks Quadrangle, Alaska. Scale, 1:200,000 or 3.95 statute miles to an inch. *Bull.* No. 337, Washington, 1908.

Supplements papers on "The Fairbanks and Rampart Quadrangles." Contour interval, 200 feet. Dotted lines represent probable topography, unsurveyed.

HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Pacific Ocean, August, 1908.
Pilot Chart of the North Pacific Ocean, September, 1908.
Pilot Chart of the North Atlantic Ocean, August, 1908.
Pilot Chart of the North Atlantic Ocean, September, 1908.

UNITED STATES.—Inland Waterway from Cape May to Bay Head. Scale, one inch to the mile. Four sheets. *Annual Report* of the State Geologist of New Jersey for 1907, Trenton, 1908.

Shows the Atlantic coast of New Jersey from Cape May to Manasquan Inlet, about 120 miles, with the proposed route of the eight-foot channel between the line of sand banks and the coast. Illustrates the report on the survey for an inland waterway from Cape May to Bay Head, carried out in 1907.

The accompanying reports give estimates of the amount of expenditure necessary to deepen such parts of this inland waterway as may be required to secure a channel of the minimum depth of eight and ten feet respectively at low water and of the width of fifty feet. The estimate for an eight-foot channel is $164,331 and for a ten-foot channel, $250,282.

Dr. Kümmel, State Geologist, says in his report, that although the proposed waterway would be of material value for commerce, its chief use would unques-

tionably be for pleasure travel and intercommunication between the many resorts upon the sea and bay shores. If the proposed improvement of Manasquan Inlet is made, it would be necessary in the passage down the coast from New York harbour to Cape May to run outside in the open ocean, a distance of only 27 miles between Sandy Hook and Manasquan Inlet. As this distance could be covered in about three hours, it would present no serious obstacle to comparatively small craft, and the remaining 125 miles to Cape May would be through sheltered inland waters.

CANADA.—Map of the Dominion of Canada. Scale, 1:6,336,000 or 100 statute miles to an inch. By James White, Department of the Interior, Ottawa, 1908.

Shows in colours the railroad system of Canada, including lines under construction and those which as yet are only located. Among the lines located is the Canadian Northern System connecting Manitoba and Saskatchewan with Fort Churchill on Hudson Bay, the proposed short outlet for grain to Europe.

CANADA.—Geologische Karte des Nordöstlichen Teiles von Canada. Scale, 1:7,500,000 or 118.35 statute miles to an inch. *Petermanns Mitt.*, Gotha, No. 6, 1908.

Reduced from the map in the *Report* of the Geological Survey of Canada, 1906. Supplements an article by Prof. Dr. H. Haas: "Zur Geographie und Geologie Canadas und des arktischen Archipels von Nordamerika."

ARGENTINA.—Principal Cattle Areas. Scale, 235 statute miles to an inch. *Bull.* of International Bureau of Amer. Republic, Aug., 1908.

A sketch map on which the principal cattle areas are shown by shading. Illustrates "Beef Production in the Argentine Republic," by Prof. H. W. Mumford.

ASIA.

CEYLON.—City of Colombo. Scale, 1:12,672 or 16 chains to an inch. Printed and published under the orders of Surveyor General P. D. Warren, Colombo, 1907.

CEYLON.—Agricultural Map of Northern Province, Ceylon. Scale, 1:253,440 or 4 statute miles to an inch. Survey Department, Colombo, 1908.

Excellent specimens of the map work which the Survey Department of Ceylon is producing. The map of Colombo is a generalization of the information given on the large survey map of the city. The agricultural map of the Northern Province shows the distribution of cocoanut and other plantations, paddy fields, grass lands, jungle and scrub, forest, and waste lands.

EAST INDIES.—Linien der Orient-Küstenfahrt des Norddeutschen Lloyd, Bremen. Scale on the equator 200 statute miles to an inch. Deutsche Erde, No. 3, Justus Perthes, Gotha, 1908.

Shows in red 16 steamship routes between the islands of the East Indies, together with their sea connections by North German Lloyd lines with Siam and China.

PERSIAN GULF AND ARABIA, SOUTH COAST.—Salzgehalt des Oberflächenwassers

im Persischen Golf und der arabischen Südküste. *Annalen d. Hydrog.*, No. 7, Berlin, 1908.

Supplements a paper: "Der Salzgehalt des Persischen Golfes und der angrenzenden Gewässer," by Prof. Dr. Gerhard Schott, based upon the analyses of water specimens taken in February, May, and June, 1907.

PHILIPPINES.—Map Showing Principal Mineral Districts. Mercator Projection. Scale, 1:5,000,000 in latitude 13° N., or 78.9 statute miles to an inch. Bureau of Science, Manila, 1908.

Supplements a paper on "The Mineral Resources of the Philippine Islands." A sketch map giving the distribution of gold, copper, iron, and coal, and railroads completed or projected.

MANCHURIA.—Map of Antung. Scale, 600 yards to an inch. *Returns of Trade*, Part II, Vol. 1, Northern Ports, Shanghai, 1908.

Shows the plan of the town, navigable conditions of the Yalu river, and the proposed bridge across the Yalu to connect the Korean and Manchurian railroad systems.

EUROPE.

GERMANY.—Deutsches Reich. Three Maps Showing in Colours (1) Increase in Population from December 1, 1900 to 1905, (2) Natural growth of population or preponderance of births over deaths in the same Period, (3) Areas gaining or losing population in that time by Immigration or Emigration. *Statistisches Jahrbuch* für das Deutsche Reich, Berlin, 1908.

GERMANY.—Hydrograph. Karte des Gebietes zwischen Dill, Lahn, Rhein u. Sieg. Scale, 1:150,000 or 2.38 statute miles to an inch. By Fritz Loos. *Geographische Mitteilungen aus Hessen*, No. 4, Giessen, 1908.

Mr. Loos drew the map upon the basis of the Government topographic map in 1:100,000. Relief is shown by 6 tints of brown; contour interval, 100 meters; streams coloured to show whether they belong to the drainage territory of the Rhine, Lahn, or Sieg, water partings red and numbered to correspond with numbers in Mr. Loos's paper "Zur Hydrographie des Westerwaldes," under which he discusses each of the eleven water partings. The map is a fine example of the cartographic representation of the distribution of drainage in a comparatively small area, like this of the Westerwald.

GERMANY.—Reise und Eisenbahnkarte von Deutschland. Scale, 1:2,000,000 or 31.36 statute miles to an inch. Von C. Opitz. With alphabetic list of places. Otto Dietrich, Leipzig, 1908. (Price, with index of places, 60 pf.)

The map is distinguished by fullness of information clearly expressed. Town marks are differentiated to show approximate population. All the routes (railroads, main, tributary, and minor highways, those in process of construction, etc.) are indicated in red. The head of navigation on the rivers and canals, and cables are shown. The alphabetical index of place names helps this fine map to fulfill its purpose as a convenience to travellers in Germany and the contiguous lands.

FRANCE.—La Chaîne du Mont Blanc. Nouvelle édition de 1906 en 4 feuilles. (1) Massif de Trélatête. Scale, 1:50,000 or 0.7 statute mile to an inch. Supplement to the Yearbook of the Swiss Alpine Club, Vol. XLIII., Bern, 1908.

Contours with 50 meters intervals and light and shade express relief forms clearly.

SWITZERLAND.—Karte zur Reise und die Eisgebirge des Kantons Bern. Supplement to the Yearbook of the Swiss Alpine Club, Vol. XLIII., Bern, 1908.

The map is reproduced from the Zschokke-Meyerschen Reisebericht, Aarau, 1813. It shows the route of the Messrs. Meyer, in 1811 and 1812, in the Bernese Alps. They traversed the whole length of many of the glaciers in this region, besides ascending the Jungfrau and other mountains.

SWITZERLAND.—Carte du Valais et du Tessin pour Touristes. Scale, 1:300,000 or 4.73 statute miles to an inch. With 4 Insets, scale, 1:75,000 or 1.18 statute mile to an inch. By J. Frey. Geographischer Karten-Verlag Bern, 1908. (Price, paper, frs. 3.50.)

One of the superior tourist maps issued by Kümmerly & Frey & A. Francke. Contours, light, and shade are skillfully used to produce the effect of relief without sacrifice of scientific accuracy. A large variety of information is clearly expressed. The contour interval is 300 meters and the map is based upon the Government official maps in 1:25,000 and 1:50,000.

SWITZERLAND.—Orientierungskarte zu den Profilen und Trogrändern im Rhonegebiet. Scale, 1:250,000 or 3.95 statute miles to an inch. Von Hans Hess. *Zeits. f. Gletscherkunde,* Vol. II., No. 5, Berlin, 1908.

Supplements a paper: "Alte Talböden im Rhonegebiet," by Mr. Hess. Water partings, profiles, etc., are imposed in red upon the Swiss topographic map of this region.

OCEANIA.

CAROLINE ISLANDS.—Der Taifun in den Karolinen 27 bis 29 März 1907. Scale, 1:4,000,000 or 63.1 statute miles to an inch. Von C. Jeschke. *Petermanns Mitt.,* No. 6, Gotha, 1908.

Traces the route of this destructive typhoon and indicates the islands that were damaged or destroyed. Supplements an article on the typhoon by Captain Jeschke.

BOOK NOTICES.

Original Narratives of Early American History. The Northmen, Columbus and Cabot, 985–1503. With Maps and a Facsimile Reproduction. Charles Scribner's Sons, New York, 1906–1907.

Volume I contains:

First, The Voyages of the Northmen, edited by Professor Julius E. Olson. A fairly critical, and therefore welcome, review of the early sailings of the Northmen to the North-American coast. Nova Scotia is the region looked upon as most likely to correspond to Vinland. We may perhaps miss, in Prof. Olson's

mention of sources, all allusion to the late work done by the Jesuit Father Fischer on the subject.

Second, The Voyages of Columbus and of John Cabot, edited by Professor Edward Gaylord Bourne.

The collection, edited by Prof. Bourne with his usual ability, comprises good translations of the articles of agreement between the Catholic Kings and Columbus (April 17th, 1492), of the Title granted to Columbus of "Admiral, Viceroy and Governor of the Islands and Mainland that may be discovered"—(April 30th, 1492)—the (anonymous) Journal of the first voyage of Columbus, said to be in the handwriting of Las Casas.—Columbus' letter to Luis de Santangel on his first voyage (dated 15th of February, 1493, with postscript of March 14th).—The letter of Columbus to the King and Queen, without date.—The letter of Dr. Chanca, on the second voyage (no date).—Narrative of the third Voyage of Columbus, from Las Casas, "Historia de las Indias".—Letter of Columbus to the Nurse of Prince John (of the year 1500 when on his return to Spain).—Letter of Columbus on the fourth Voyage. (July 7th, 1503.) By publishing these documents together, Prof. Bourne has rendered easily accessible to the English reading public Columbian sources of importance, less known than the reports by the Admiral.

In the few pages devoted to the Voyages of John Cabot, documents are placed within reach of the reader, that otherwise would be of difficult access.

A map of the voyages of Columbus and a reproduction of the Cantino map of 1502, as well as of the first page of Columbus' letter of 1493 printed in Spanish, illustrate the book.

Volume II is devoted to "Spanish Explorers in the Southern United States" and contains the translations of:

The Narrative of Cabeza de Vaca.—Narrative of the Expedition of Hernando de Soto, by the Gentleman of Elvas.—Narrative of the Expedition of Coronado, by Castañeda.

This volume is accompanied by a fac-simile of the title-page of Cabeza de Vaca's report, printed in 1542, a contemporaneous map of the wanderings of de Soto, and a modern one of Coronado's march.

An Apology.—Almost complete blindness, and consequent inability to consult documentary material, were the cause of an error in our review of the "Coleccion de Libros y Documentos," edited by Señor Serrano y Sanz (Bulletin, May, 1908, pp. 315-317). We stated that the manuscript of the oydor Zurita, which he announces as one of his next issues, had already been printed. Such is not the case; it will be published for the first time by Sr. Serrano y Sanz, and we gladly make this correction, with sincere regret for the error. A. F. B.

Landeskunde und Wirtschaftsgeographie des Festlandes Australien. Von Dr. Kurt Hassert. (Sammlung Göschen.) 184 pp., 8 Photographic Illustrations, 6 Diagrams, and a Map. J. G. Göschen'sche Verlagshandlung, Leipzig, 1907. (Price, 80 pf.)

Probably the best compendium yet made of the geography, industries, and commerce of the Commonwealth of Australia. Dr. Hassert is a well-known authority on anthropo-geography. Thirty pages are given to the physiography and climate of Australia; twenty-five pages to the flora and fauna; thirteen pages to the aboriginal, and eighteen to the immigration, population. The resources, industries, trade and communications fill fifty-seven pages and the volume closes with general considerations on the Commonwealth and its several States.

A feature always prominent in the small books of this collection is that, while the treatment is concise, adequate expression seldom fails to be given to every essential. The Germans are fortunate to have at their hand scientific compendiums so admirable and costing so little.

Geographische Studien. Von Prof. Dr. S. Günther. 172 pp. Strecker & Schröder, Stuttgart, 1907. (Price, M. 4.)

This well-known physical geographer treats first of geographical acoustic problems, such as Tönende Sand (sounding sands in the Hawaiian Islands and elsewhere), Musikalische Naturklänge (natural musical sounds, as singing valleys in the Alps), and Abrupte Knalle (sudden reports), as the Barisal Guns of the Ganges delta. The author gives his views of these sounds and their genesis. His other chapters deal with the Antarctic problem, the history of the investigation of earthquakes, and memorial papers on Eduard Richter and Ferdinand von Richthofen.

Australasia. Vol. II. Malaysia and the Pacific Archipelagoes. By F. H. H. Guillemard. xvi and 574 pp., 47 Illustrations, 16 Maps, and Index. Stanford's Compendium of Geography and Travel (New Issue). Edward Stanford, London, 1908. (Price, 15s.)

In the fourteen years since the first issue of this work, geographical exploration has made much progress, especially in the large islands of New Guinea, Borneo, and Celebes. The new edition is, therefore, timely, for it brings geographical discoveries and surveys of ocean depths down to date and also records many political changes that have taken place in recent years in the vast regions of Oceania.

It is observed that in the new map of New Guinea "Snow Mountains" are marked along the eastern extension of the Charles Louis Mountains, the portion of this great chain where much exploratory work has recently been done. Dr. A. H. Keane, who has revised this edition, calls special attention to the fact that the joint labours of Dutch, German, and British explorers and officials have shown that the Charles Louis, Bismarck, Albert Victor, and Owen Stanley Mountains "form a continuous, lofty and in part snowy range which traverses the whole island from west to east and in many of its sections maintains great altitudes of from 12,000 to 16,000 feet." Kersting, Lauterbach, MacGregor, Knutsford and others have contributed to this discovery that a central backbone of mountains extends clear across the island.

Further particulars are given in the chapter on New Guinea where it is said that the eastward extension of the Charles Louis Mountains contains the loftiest known peaks in the whole area between the Himalayas and the Andes; also that the eastern continuation of this central system through German and British New Guinea has been clearly established by Lauterbach and Kersting, who, striking inland from Astrolabe Bay on the east coast, sighted many forest-clad ridges rising one behind the other, the vision being bounded north and west by a lofty range apparently from 13,000 to 16,000 feet high.

Dr. Guillemard, well known as an authority on Oceania, has made this reading and reference book entirely worthy of the high reputation of the volumes in "Stanford's Compendium of Geography and Travel." It is likely for years to be the fullest record in one volume of our knowledge of this part of the world.

Through France and the French Syntax. A Book of French Composition. By Robert Louis Sanderson. xiii and 154 pp. Silver, Burdett and Company, New York, Boston and Chicago, 1907.

This is a geographical reader describing a journey through France and supplied with an English-French vocabulary and copious notes to help Americans, for instance, to turn the English text into idiomatic French. A book on composition like this compels the student to think in the language he is studying. It is much easier for the English than for us to live a while in the atmosphere of French and German speaking; so much the more reason why our students should give earnest attention to French and German composition. This book will help them, at least,to acquire the idiomatic French of intelligent conversation. Some typographical blunders are observed; for example, in the definition of hungry, *faim* is spelled *fain*.

Sfere Cosmografiche E Loro Applicazione Alla Risoluzione di Problemi di Geografia Matematica. By Prof. Angelo L. Andreini. xxix and 326 pp., 12 Illustrations, Appendix, and Index. Ulrico Hoepli, Milan, 1907. (Price, L. 3.)

A handbook on the armillary sphere and the celestial and terrestrial globes and their uses in solving the problems of mathematical geography. A history of the development of these appliances is given, together with descriptions of them and of their construction. Many questions and problems are named, and the methods of utilizing the globes and the solutions thereby attained are given.

Neue Menschen. Ein Jahr bei den Nachbarn des Nordpols. Von Knud Rasmussen. Einzig autorisierte Übersetzung von Elsbeth Rohr. vii and 191 pp.. Five Illustrations and Portrait. Verlag von A. Francke, Bern, 1907. (Price, M 3.60.)

Rasmussen was a member of the Danish literary expedition which spent the winter of 1903-4 in that part of the northwest Greenland coast inhabited by the Smith Sound Eskimos. His mother was a South Greenland Eskimo, his father a Dane, and he was educated in Denmark but had lived most of these years among his kinspeople in Greenland. He therefore knew the Eskimo language, had no difficulty in understanding the Smith Sound dialect, and was well equipped to learn much about these most northern inhabitants of the earth. The book is a German translation of the Danish text. Its literary merit is rather exceptional, and the story it tells of the lives of these natives will interest all classes of intelligent readers. It is full of incident throwing light both upon the outer and inner life of the people. Their folk-lore is well represented, but not so fully as in the Danish edition.

Modern Lithology Illustrated and Defined. By Ernest Howard Adye. 128 pp., 15 Plates, Glossary, and Index. W. & A. K. Johnston, Edinburgh, 1907. (Price, 10s.)

The book deals with the microscopic study of rocks. Each plate contains typical rock sections, drawn and coloured from the actual microscopic preparations. Both colours and contours are limned with much fidelity. The text gives details concerning the illustrations and conforms to the classification now generally used. The work is intended to simplify some phases of the subject for students and it should be a valuable help. The author advises that in the study of rocks actual specimens be examined by the side both of drawings and text.

A Historical Geography of the British Colonies. Vol. VI. Australasia. By J. D. Rogers. Part I. Historical. viii and 308 pp., 9 Maps, and Index; Part II. Geographical. 132 pp., 13 Maps, and Index. H. Frowde, The Clarendon Press, Oxford, 1907.

Concise accounts first of the history and then of the geography of Australasia. The history is practically a condensed but still readable record of everything of large significance relating to Australasia. Among the best features of the book are the copious references to the literature of the subject in the form of footnotes. The two indices cover the contents minutely and the whole is an excellent handy reference volume, which usually points the way to sources from which further information may be derived.

Exercises and Problems in Physical and Political Geography. By Alfred E. Logie. 70 pp., Illustrations, and Index. A. Flanagan Company, Chicago.

This little book contains a large number of geographical problems to be solved only through reasoning processes. The powers of reason are thus exercised more than the faculty of memory. The problems (all in physical and political geography) are excellent; and they will suggest to teachers how they may be added to and indefinitely varied.

Deutsche Kolonien. Koloniales Lesebuch von Dr. Willy Scheel. viii and 226 pp., 1 Illustration and Index of Names. C. A. Schwetschke & Son, Berlin, 1907. (Price, M. 2.30.)

The book is a good example of a method the Germans are employing to spread knowledge of the colonies and of their importance to the Fatherland. It is a reader for the higher and the technical schools and for the people generally. Its contents consist of selections from the writings of colonial leaders whose descriptions of the various colonies and ideas of the methods and prospects of development are based upon their personal observations. In making selections for the book it is obvious that neither severely scientific or technical matter nor material that was merely popular would serve the purposes of the compilation. But Dr. Scheel found a happy mean, for all his selections are not only solid and authoritative, but also interesting and within the range of popular comprehension. The chapters cover all of the German colonies, and the volume concludes with brief reviews of each of them and an alphabetical list of place and other names with definitions.

Les Falaises de la Manche. Par Jules Girard. 194 pp. and numerous Illustrations. Ernest Leroux, Paris, 1907.

A study of that part of the coast of France on the English Channel, lying between the mouth of the Seine and the Bay of the Somme, about eighty miles. This shore is lined with cliffs as high as 400 feet in places, and much worn by the sea. The author describes the geology of the region, its physical forms, the natural influences that shape them, the movement of the sea along the coasts, and the work of the waves, the genesis of the beaches and shores, the extent and effect of littoral abrasion and the interpretation of the changes in the coasts.

French engineers have reason to believe that the annual wear of the coasts amounts to about seventy acres. What the sea wins from the land on one coast it loses on another.

Limnologia. Studio Scientifico dei Laghi. By Dr. G. P. Magrini. xv and 242 pp., 53 Figures, Map, and 12 Appendices. Ulrico Hoepli, 1907. (Price, L. 3.)

One of the excellent scientific handbooks for which the house of Hoepli is known. The Italians have shared prominently in the work of advancing limnology, or the scientific study of lakes, to its present position, and this volume is an adequate guide to the methods of pursuing the study. The instruments used and how to use them are described, and the work deals with the details of investigating the genesis, physical and chemical nature, movements, biology, and other conditions and phenomena of lakes.

La Questione Congolese. By Aristide Cornoldi. 63 pp., Appendices and Map. Milan, 1907.

This monograph has been published under the auspices of the *Società Italiana di Esplorazioni Geografiche e Commerciali* of Milan and of the *Istituto Coloniale Italiano.* It is an excellent and impartial study of the whole Congo question, including the history of the organization and development of the State, the nature of its government, its relations with the natives, the report of the Committee of Investigation in 1906, the reforms proposed, the debates in the British and Belgian parliaments, and the probable future of the country.

A Scientific Geography. Book V. Africa. By Ellis W. Heaton. 109 pp., 38 Maps and Diagrams, and Glossary of Geological Terms. Ralph, Holland & Co., London, 1907. (Price, 1s. 3d.)

The excellent plan on which the author is writing this series of geographies has been outlined in the BULLETIN (p. 764, 1907). Some statements and omissions in the present volume should be corrected in the next edition. Lake Ngami, mentioned as one of the chief salt lakes in Africa, has been in a state of complete desiccation for years. The Kong mountains (p. 23) do not exist. Burton and Speke did not penetrate the lake plateau southward by way of the Nile, but westward by way of Zanzibar (p. 33). Liberia was founded before, not after, the abolition of slavery in the United States (p. 34). The Congo does not afford 2,000 miles of navigable waters from Leopoldville to Nyangwe, because navigation is interrupted by rapids for 75 miles between Stanleyville and Ponthierville and for over 100 miles between Kundu and Nyangwe.

A Modern Slavery. By Henry W. Nevinson. x, 216. Harper & Bros., London and New York, 1906.

Cocoa, like other forms of drink, has its slaves. They are found chiefly in São Thomé and Principe, two small Portuguese islands which lie in the Gulf of Guinea, close to the equator, and about a hundred and fifty miles from the west coast of Africa. The islands are extremely beautiful, with dense wooded slopes rising to a height of five and even seven thousand feet within a few miles of the sea. Rain falls copiously, and the volcanic soil is very rich. "The islands," to quote Nevinson, "possess exactly the kind of climate that kills men and makes the cocoa-tree flourish." Great profit can be realized from plantations, provided the necessary labour can be procured, but labourers will not go to the islands voluntarily. Therefore the Portuguese practise slavery, and bring negroes from the

interior of Angola, or Portuguese West Africa, just as the old slave-traders brought them to America a century or two ago. The system is not called slavery, but goes by the euphemistic title of "contract labour." It is carefully cloaked under the form of a five-years' voluntary contract between the negro, to whom wages are paid at the nominal rate of $2.40 per month, and the planter, who provides food, clothing and shelter. The wages are paid regularly, but the amount is only about half that stipulated in the contract, and can be spent only at the plantation store. In spite of the appearance of legality, the slavery is absolute. Negroes are bought at the rate of 125 or 150 dollars a head, boys and full-grown girls being the most valuable. They are driven to work with whips, are hunted with dogs and guns when they run away, and are beaten to death when caught. The work in the cocoa plantations is so severe and the life so hopeless that from 14 to 20 per cent. of the twenty or thirty thousand slaves on the islands die every year, and the death rate is ten times as high as in England.

In order to investigate the system of slavery in Portuguese Africa Mr. Nevinson visited the islands in 1905, at the suggestion of the Editor of *Harper's Monthly*. He also visited the mainland where the negroes, variously estimated at from four to twelve millions, live in constant fear of being stolen and sold as slaves to the white man. On a journey of some five hundred miles by ox-cart into the interior he crossed the three physiographic zones which characterize southern Africa. He describes vividly the low, unhealthy coast belt, not so rainy as other parts, but full of river swamps, hot, steaming, deadly. Then comes the mountain zone, which is really the dissected edge of the central plateau—a beautiful forested region with rugged hills and steep valleys where the great slave-road to Bihe and the far interior climbs "ladders of rock." East of the mountains the great plateau stretches away for uncounted miles as a forested region of low relief, with scenery suggesting that of England. Its elevation of 5,000 feet causes the nights to be cool, though the days are hot. Eastward the rainfall decreases, and beyond Bihe there is the so-called "Hungry Country." It is a region of rolling hills composed of pure white sand half covered with a sparse growth of trees. The succulent stems of the grasses are bitter instead of sweet, and every living thing suffers for lack of salt. Even the butterflies and bees gather in huge swarms where salt is spilled, although they pay little attention to sugar or sweets. Apparently, the Hungry Country was once a sandy desert during some epoch of drier climate, but now is moist enough to support a poor sort of vegetation.

Most of the people of Angola live on the plateau, but, as Nevinson says, "where the road runs, the natives will not stay. Exposed continually to the greed, the violence, and the lust of white men and their slaves, they cannot live in peace. . . . [so where] a road or fort or any other sign of the white man's presence appears, the natives quit their villages one by one and steal away to build new homes beyond the reach of the common enemy." Yet the natives are friendly and peaceable, as appears from their cordial relations with the missionaries, whom, alone among Europeans, they know to be honest. "In modern Africa an honest man has only the whites to fear." The natives, like most Africans, practice domestic slavery—half the people being slaves—but it is mild compared to the horrors of the plantation slavery of the Portuguese on the mainland and still more on the islands. Now, as in the days of Livingstone, rum, polygamy and slavery are the great curses of Africa. After reading Nevinson's most interesting book one cannot doubt that slavery is still a tremendous problem, and that its origin and continuance are due to the fact that, for the present, peculiar physi-

ography conditions have appealed to the selfishness of the Portuguese so strongly as to overcome all scruples. The physiographic environment is such that on the one hand agriculture is extremely profitable, while on the other the natives are disinclined to work, and people of other races cannot usually live long. Hence the Portuguese have been led to compel the natives to work as slaves. E. H.

Das deutsche Dorf. R. Mielke. 132 pp., mit 51 Abbildungen im Text. B. G. Teubner, Leipzig, 1907.

This little volume on the German Village is number 192 of a series which is semi-scientific in character, but is calculated to be of interest to the general public. The author found his task one beset with some difficulties, since those who before him had made the German Village a field for special research were, as he says, students of economics or of architecture. Being a peasant born and having a long acquaintance with village life, is in part the author's claim to fitness for his undertaking, and he has honoured his peasant ancestry in writing so interesting a volume.

We expect the German Villager to have a love for his local environment; and that traveller from other lands who, leaving the beaten track of the mere sight-seer that he may make an acqaintance with unspoiled country and village life, does not have his anticipations of finding things interesting realized, is the traveller with a disposition not to be envied.

In so far as space permits, the author has undertaken to combine the geographical, the historical, the political, and the cultural elements, which have entered into the making of the German Village, in due proportions. In his first few pages we have a consideration of origins, not omitting the information to be found in Tacitus and other writers of the day of early Teutonic migrations and settlements. The belief is expressed that the village of the early day was by no means so compactly built as is now common in most parts of the Empire. The individual units of the village community, which community in itself was long a political unit, were the single and sometimes widely separated settlements, like many of those settlements yet to be found in parts of northwest Germany. How time and circumstances, including the physical environment of the various districts in which the villages are located, including also political and economic changes which have taken place in the years as they have come and gone; how all these have wrought as factors in compacting the village or in determining its present day character and general appearance, are points which are made prominent throughout the work.

Noting the differences in origin, differences in appearance architecturally, differences in territorial extent, including a reference to the fact that villages often have within their bounds a very considerable amount of tillable and forest land, the author comes to a consideration of classification. In this classification we find those named which are made up first, of isolated farms or homes (Einzelhöfe); second, those compactly built (Haufendörfer); third, hamlets (Weiler); fourth, villages which stretch along the public highway, which highway constitutes the one village street (Strassendörfer). Keeping prominent this classification, the author proceeds to a consideration of the villages in the several regions of Germany. A section of the book is devoted especially to a consideration of the culture of the villages, covering very briefly that which is meant by the German word "Kultur." Referring to the "Village at the close of the nineteenth century"

its general influence on the course of national life throughout the centuries is observed, but with an expression of regret the author sees in the last forty years a decline of the village in much that through the centuries served to make it so important and so interesting a centre of German life. The illustrations are numerous and are of good character, though small. The literature of the German Village is referred to in a concluding page. E. L. S.

Patrollers of Palestine. By Haskett Smith. pp. xi, 361. London, Edw. Arnold, 1906.

This book is the work of an English clergyman thoroughly familiar with Palestine. As a contribution to geography it is not especially valuable, but for the student of the Bible it contains much that is of great interest. Mr. Smith was at one time the editor of Murray's *Handbook to Syria and Palestine;* and the flavour of the hand-book pervades the present volume. The author conducts a party of imaginary travellers from Jaffa to Jerusalem, Jericho and the Dead Sea. On the way he describes the scenery, the appearance of the people and villages, the modes of travel, and the difficulties of the past as compared to the comforts of the present. He also endeavours to write a satire upon the tourists of Palestine. Each of the party represents a type; for example: there are the "Enthusiast," the "Matter-of-Fact Man," the "General Nuisance," and others, led by the Sheikh. The latter, alone, is a real person; and one surmises that he is Mr. Wilson, the author of *Peasant Life in the Holy Land.* The other travellers, being always in character, do not seem like real people, and are sometimes tiresome.

The main purpose of the book is to set forth in popular style some of the most important results of recent research in identifying scriptural sites, especially in Jerusalem. This is well done. The reader receives a strong impression of the extraordinary accuracy of the Bible in describing topography and customs. Geographically one of the points worth noting is the description of views. For instance, from the steamer off Jaffa one sees at a glance most of western Palestine from the yellow sand-dunes on the coast, across the coastal plain, green in spring, to the hill-country of Samaria on the north and Judea on the south. Again, from Bethlehem,—the "Fruitful" as it was fittingly called in earlier times,—one looks across the deep "Ghor" where a bit of the Dead Sea is in sight, and sees the hills of Moab, only 25 miles away. When Ruth, the Moabitess, left her home and kindred, and followed Naomi to Bethlehem, she did not go to a far country, as we are apt to think. She probably was still in sight of her native village. "There is a tendency (to quote Mr. Smith) in most persons' minds to imagine everything in connection with this land [Palestine] to be on a very much larger scale than it really is. For example, it would be much more in accordance with the fitness of things if we spoke of 'Mound Moriah' [instead of 'Mount Moriah']; for really the hill on which Solomon built his temple was little more than a mound." Another common misapprehension is corrected in the words of a school-boy, who was told to describe the course of the Jordan river. "The Jordan," so he wrote, "is a river which runs straight down the middle of the map of Palestine; but, if you look at it very closely, *it wiggles about.*" The Jordan is emphatically a meandering river, which flows in a terraced channel incised in the soft strata of an alluvial plain. If the "Sheikh" were left to tell his story concisely without the help of his "tribe" of "Patrollers," Mr. Smith's book would attract the thoughtful reader much more than it now does. E. H.

A History of Western Tibet, one of the Unknown Empires. By Rev. A. H. Francke. London, S. W. Partridge & Co., 1907.

Mr. Francke refers to his book as a popular history, thinking the time has not yet come for a "scientific history," since there yet remain, in the opinion of the author, many "historical records" which should first be consulted but which are difficult of access for Europeans. It is one of the merits of Mr. Francke's work to show the existence of a continuous narrative of Western Tibet from very early times, a fact which had been doubted by Sir Alexander Cunningham in his account of Ladakh.

The author is connected with the Moravian missionary enterprises in the Tibetan region, apparently the most important of all in that particular section concerning which he writes. This fact in itself gives us assurance that he writes with knowledge. Mr. Thomas of the India Office, who has prepared a brief preface to the work, speaks enthusiastically of the author's pioneer researches into the dialects, customs, folk-lore, ethnology and archæology of Western Tibet and of his many published studies touching the neighbouring Dards. A somewhat elaborate list of sources of information is given in the introductory chapter. Since the translation by Dr. Karl Marx of the *Ladvags rgyal rabs,* the "Book of the Kings of Ladakh," the author thinks himself safe in venturing on a popular history of the region.

After a brief reference to the knowledge of the country possessed by early Greek and Roman writers, we are introduced to the tribes or races who have come in to occupy the land, with a particularly clear and readable account of the Mons, and the Dards—of their ancient and their present relations to the country. The former of these Aryan colonizers, who probably came up from northern India, are supposed to have introduced the Buddhist faith, founding villages and towns, and producing works of art which have hardly been excelled in western Tibet. The Dards, it is thought, were the more vigorous, conquering in time the former named tribes. Herein, the author finds, is the explanation for the fact that the Mons came to occupy a much lower place than that occupied by the Dards.

Through a series of chapters, beginning with a consideration of the country's history as contained in Chinese records, from the middle of the seventh century, the author carries his narrative through the inauguration of the central Tibetan dynasty and its first kings beginning in the tenth century, through the time of the Balti wars of the sixteenth and seventeenth centuries, and the great Mongol wars of the middle of the seventeenth century, to the fall of the western Tibetan Empire near the middle of the nineteenth century. In a concluding chapter which is called "a missionary's review" the author points to the opportunities of the Christian missions. He convincingly shows that Lamaism or Buddhism is not true to its professed doctrines of peace; "Buddhism would never have spread over the greater part of Asia if it had insisted on a strict observance of its doctrines." It has not left the morals and the customs of the people in an improved condition. While Buddhism may not be held responsible for much that is degrading in the life of the people who have accepted it in this country, as the existence of polyandry, it does not seek to uplift. There is hope for Christianity in the country, he finds, in the fact that both Mohammedans and Buddhists are weakened by being brought into contact with each other.

The book contains about twenty-five well-selected illustrations with four maps of the region. E. L. S.

Historical Geography on a Regional Basis. The British Isles. With six maps, Vol. I, by Ernest W. Dann, B.A. (Oxon.). pp. vii and 182. J. M. Dent and Company, London, 1908. (Price, 2s. 6d.)

For easy lessons arranged in series, and short courses to knowledge, there seems to be a never-ending demand. Sometimes it may be the ambitious editor who is responsible for the continuous flow, more often perhaps it is the publisher who is making business. But through all this we are getting on, and the generations on the whole are waxing wiser. Dent's New Series of Mathematical and Scientific Text Books for Schools is thus far in its issue very largely mathematical. It is a novel and a commendable feature to include a volume or volumes (a second on Europe is promised) on Historical Geography. This bears testimony to the interesting fact that Historical Geography as a branch of knowledge is increasing in favour. The volume is merely a beginner's book. In his introductory chapter the author undertakes to present in a general way the relations of Geography and History.

The best treatises on Historical Geography have been written by those who have approached the subject from the standpoint of the historian, that is, have had a thorough training in historical studies and historical methods, rather than by those who have approached it from the standpoint of the physiographer or geologist; and this does not argue that the writer of a work on historical geography should not be a profound student of physiography to be eminently successful in his task. It is the bias of a physiographer which is recorded in such statements as our author makes (p. 2), statements which are striking, but which are not true: "It is not too much to say that—all leading actions of men have their first cause in the nature of the land in which they live." The nature of the land is a factor, and a very important factor, but we should never forget that it is a *factor*. Let us, however, be just in citing from Mr. Dann's work; but admittedly there is confusion of statement. "There is a distinct danger of overrating the effect of environment on man," is a warning recorded on page 25.

To illustrate "physical features and history" a skeleton map is given which the author explains in his chapter II. Recognizing that the British Islands are merely an isolated portion of the continental shelf of Europe, a justification for a treatment such as is here given of regional geography lies in the fact that the author has continually before him "the *historical* aspect of geography." There is a good brief chapter on "Migrations" and how these have been geographically determined. Each of the larger divisions of the region is given consideration as a unit and also in its relations to the whole. What geographically has contributed to the making of a great sea-power very naturally is not overlooked. The book concludes with a word on "Historic Towns" and the scantest reference to "Greater Britain." E. L. S.

Die Entstehung der Kontinente, der Vulkane und Gebirge. Von P. Osw. Kohler. Pp. 58. Leipzig, Verlag von Wilhelm Engelmann, 1908.

This treatise is a discussion of the "passive plutonists," as the author calls them, who in their hypotheses concerning the origin of the mountains deny all activity of the heated interior and all influence of physical processes in the earth's crust, asserting that the form of the earth's surface arises chiefly from crumbling, sinking, folding and lateral pressure (p. 43).

Three hypotheses in the "passive plutonic" theory he attacks; (1) the basis of the theory, namely, the assumption that the interior of the earth has shrunk

faster than the crust, is false; (2) the notion of a "depth" into which "subsidence-fields" have fallen is unfounded, and no such "depth" has ever existed; (3) the theory that continental "clods" that have refused to sink contradicts all established laws of statics. Two hypotheses, however, of the "passive plutonists" he adopts. (1) There has taken place a cooling of worlds, especially of the earth, and this cooling process is still going on. (2) The interior of the earth is yet much hotter than the exterior. He shows that the exterior must cool off faster, and hence shrink more than the interior, and that fissures are thus best explained which have gradually become filled with deposits and eruptive products. The cause of the various inequalities of the earth's surface, the author finds in "hydrothermal processes." There is going on a constant, though slow, circulation in the earth, especially in its crust, a circulation of heat and water like that of the water in the atmosphere. Volcanoes are, as it were, fountains, for which the "hydrothermal processes" furnish the needful hydrostatic pressure. Most islands and mountains have arisen through many slight and partial upheavals, not by one sudden convulsion. In the last chapter the author discusses the origin of granite and its connection with volcanic formations. E. L. S.

The Mother of California. By Arthur Walbridge North. xi and 169 pp., Illustrations, Maps, Appendix, and Index. Paul Elder & Company, San Francisco and New York. (Price, $2.)

The conspicuous fact concerning this book is that it is the only work yet published that tells concisely and clearly the remarkable story of Lower California, a great region at our very doors that has been as poorly mapped and as little known as many of the out-of-the-way corners of the world. To perform this useful task Mr. North dug into the Spanish records from first to last and took from them all the facts essential to make a vivid and consecutive narrative of the history of Baja California. He supplemented this work by extended journeys into the peninsula for the study of its geography, its fauna and flora, its human remains, its inhabitants of to-day, its resources of all kinds, and its prospects of development.

The result is that he supplies in a comparatively small book the material required to give to his readers a comprehensive idea of what the great peninsula has been, what it is, and what it may become. He has thus made a very useful contribution to geographical literature. About half of the volume is given to the history of the peninsula and the remainder to a description of the physical, political and social conditions of lower California and its mineral and other resources. The maps are adequate and the other illustrations, from the author's own photographs, are good and striking.

Weltkatastrophen. Betrachtungen über die zukünftigen Schicksale unserer Erdenwelt. Von M. Wilhelm Meyer. 193 pp., Hermann Paetel, Berlin, 1907. (Price, M. 1.50.)

One of a series of small volumes published by Paetel which are designed to present historical and scientific subjects in a way to interest and edify the youth of Germany. Among the topics in this volume (No. 22 of the series) are earthquakes, comets, meteorites, solar radiation, and the future of the earth. These books contain the best results of research and the latest thought in several departments of knowledge, so far as they are adapted for the consideration of young readers.

Practical Exercises in Physical Geography (with Quarto Atlas). By William Morris Davis. xii and 148 pp., and Index. Ginn & Co., Boston, New York, Chicago, and London, 1908.

Professor Davis says in his preface to this Manual that the text and accompanying atlas are intended to provide a series of disciplinary exercises which may be assigned as "laboratory work" in connection with any of the modern text-books on Physical Geography:

> Experience has shown that a student may fail to acquire a clear understanding of the facts and problems of Physical Geography if they are presented only through the text of a printed page; and that even the ornamentation of the page by pertinent illustrations does not always suffice to insure a full comprehension of essential points. The student's attention must be directed to and detained upon each feature of a complicated fact, each step of a large problem, in order that the facts and problems may reach his understanding and remain in his memory; hence the desirability of combining the performance of a series of systematic exercises with the study of a text.

The topics of these exercises are such as are treated in greater or lesser fullness in all recent text-books. They embrace: The Valley Systems of the Lands; A Coastal Plain; Valleys in a Coastal Plain; Plateaus and Canyons; The Sculpture of Mountains; Volcanoes and Lava Flows; The River Cycle; Shore Lines; The Distribution of Temperature; The Prevailing Winds of the World; Weather Maps; and Ocean Currents.

The atlas plates are, with some exceptions, ideal designs and not copies of actual occurrences, in order to secure well-arranged and systematic progress in teaching the subject. The author thought it better to use ideal designs, because the illustrations of typical features in weather and topographic maps are usually complicated by the addition of irrelevant details, distracting to the beginner.

Each exercise in the manual refers to the related figures and plates in the atlas and contains questions, his answers to which the student must record in his note-book.

Teachers of physical geography have generally recognized the need for such exercises and material for laboratory work. They will welcome this additional and thorough appliance for the teaching of the subject which Professor Davis has now supplied.

L'Evolution souterraine. Par E.-A. Martel. 388 pp., and 80 Illustrations. Ernest Flammarion, Paris, 1908. (Price, 3.50 fr.)

This small octavo, attractive in mechanical production and adorned with many striking photographs, most of them the work of the author, is practically a *résumé* of the progress of our knowledge of the subterranean regions during twenty-five years of research, and especially of the work promoted by L'Académie des Sciences. The aim of the author is to set forth known facts in a way to interest intelligent readers. His pages show that he has consistently avoided dogmatic conclusions as to things we think we know, or concerning which we are still ignorant. In the field of geology he discusses the fissuration of the earth's crust and tectonic movements, their origin, elements, and importance. He then treats in order the subjects of subterranean heat and vulcanism; subterranean waters and air; caverns, minerals, magnetism, and gravity; influences of ground waters upon the public health; subterranean floras and faunas, fossil and present; tertiary, paleolithic, and neolithic man; the various human uses of caverns, etc. Mr. Martel is one of the foremost authorities on caverns and their phenomena, and this careful compilation of data concerning the subterranean world is partly drawn from his own studies covering many years.

Historical Geography on a Regional Basis. By Ernest W. Dann. Vol. II, Europe. xi and 215 pp., 7 Maps, List of Authorities, and Index. J. M. Dent & Co., London. 1908.

Three main factors, the regional, the political, and the chronological, are involved in the study of historical geography. In the two volumes of which this is the second, Mr. Dann correlates the physical with the human; in other words, he shows, with a commendable effort to avoid exaggeration, how far geographical conditions have affected the march of history in a given area. He reviews in the present volume the past history of different parts of Europe in the light of their geography. This method of teaching history will commend itself to all geographers and especially to the large number who now more than ever before are correlating the facts concerning man and his environment. The excellent black and white maps use various symbols to show elevations above the sea and contours for ocean depths.

In the Land of Pearl and Gold. A Pioneer's Wanderings in the Backblocks and Pearling Grounds of Australia and New Guinea. By Alexander Macdonald. xi and 318 pp., and 17 Illustrations. Blackie & Son, London, Glasgow, Dublin, Bombay, 1907. (Price, 10s. 6d.)

These sketches are little pictures of life in Australia and British New Guinea, of no profound significance, but interesting and valuable as affording glimpses of pioneer conditions in some out-of-the-way corners of the world. The book is anecdotal and conversational in large part, but there are also solid description and explanation. The following quotation may correct some inaccurate impressions of the work at the famous pearling grounds off the north coast of Australia:

> Many people imagine that pearling, like gold-mining or diamond-digging, is in the main a speculative concern, in which failure to obtain the gem means ruin. As a matter of fact, pearls play quite a secondary part in this attractive industry. It is the shell that forms the remunerative commodity of these waters, pearls are indeed too scarce in themselves to attract the fortune hunter. Many hundreds of shells may be opened before one pearl is found and I have known instances where the jewel has not been seen throughout a whole season. So long, however, as mother of pearl commands the price it has done these many years, there will be few failures among the fleets.

The author says that the work is rarely carried on at a depth of over 15 fathoms. The bivalves are numerous in deeper waters, but no diver can endure the enormous pressure sustained on the lower beds. There are no white divers employed in the work on this coast, and the natives always use the diving dress, for the waters abound in sharks.

The book is illustrated by excellent full-page half-tones.

Berlin and its Environs. Handbook for Travellers. By Karl Baedeker. Third Edition. x and 247 pp., 6 Maps, 19 Plans, and Index. Karl Baedeker, Leipzig, 1908. (Price, M. 3.)

As the greatest purely modern city in Europe, Berlin has its special and characteristic interest. The imposing imperial and national edifices and the great public collections are described with particular attention, and many other objects of interest to the cultivated traveller have been selected for special treatment. The sub-division of the large plan of Berlin into three sections of different colours facilitates reference, and a plan of the inner town on a larger scale has been added to the present edition.

To the Top of the Continent. Discovery, Exploration, and Adventure in Sub-arctic Alaska. The First Ascent of Mt. McKinley, 1903–1906. By Frederick A. Cook. xxi and 321 pp., many Photographs, Frontispiece in Colour, Drawings and Maps. Doubleday, Page & Company, New York, 1908. (Price, $2.50.)

To have reached the top of the culminating summit of North America was work enough for a single season. In fact, Dr. Cook gave two summers to his attempts on Mt. McKinley, and he needed the experiences and the defeats of 1903 to win the triumph he achieved in the campaign of 1906.

It is not surprising that the story of both these notable expeditions fills a volume that is not small. Many hundreds of miles were traversed with pack animals and boats to reach and to return from the stupendous mountain. Many advances and retreats marked the laborious efforts to find the route by which, at last, Dr. Cook and Mr. Barrille were able, with continued exertion spread over many days, to attain the summit of the highest peak of the continent. The days and months were filled with striking incidents, and the whole story of untiring effort, discouragement, repeated defeat, and final victory was worth presenting to the public in the handsome volume the publishers have made of it.

The photographs are a remarkable feature of the volume and especially notable for the fact that they include a series of pictures illustrating the various stages of the ascent to the very top of the mountain. The coloured frontispiece of Mt. McKinley is from a painting by Mr. Russell W. Porter, whose efficiency in field surveying has resulted in a topographic map of the McKinley region. The volume is enriched by four appendices: (1) A Sketch of the Geology of the Mt. McKinley Region, by Mr. Alfred H. Brooks; (2) Biological Data and Specimens collected by Mr. Charles Sheldon and described by Mr. Wilfred H. Osgood; (3) The Cook Inlet Aborigines by Mr. Sheldon; and (4) a reprint of Mr. Brooks's well-known paper on Railroad Routes in Alaska. Unfortunately the work has no index.

India-Rubber and its Manufacture. With Chapters on Gutta-Percha and Balata. By Hubert L. Terry. viii and 294 pp., 18 Illustrations, Bibliography, and Index. D. Van Nostrand Company, New York, 1907. (Price, $2.)

India rubber has become an almost indispensable commodity, and this circumstance has stimulated the interest of the public in its natural history and its manufacture. This volume is not a handbook for those engaged in the rubber trade. Its purpose is to supply to the general and the critical reader the latest information relating to the whole subject of India rubber. Mr. Terry has admirably carried out his design, and the fact that the story of rubber and its uses is of unusual interest has enhanced the readable quality of the book.

The author tells of the discovery of India rubber's characteristics and usefulness, describes its production, explains its chemical and physical properties, and deals with vulcanization and other processes. The chapter on India rubber plantations show how widely and successfully American rubber plants, especially Pará, and Castilloa have been introduced into Asia. There are chapters on "India rubber substitutes," "reclaimed rubber," "the washing of crude rubber," "the compounding of India rubber," "India rubber solvents," "gutta percha," "balata," and a series of chapters on the production of all kinds of rubber goods. The work is more comprehensive than any other in English on this subject.

OBITUARY.

James Duncan Hague.
1836–1908.

Mr. Hague died on the 3rd of August, at his summer home in Stockbridge, Massachusetts, after a brief illness.

He was born and educated in Boston, entered the Lawrence Scientific School at Harvard College in 1854, studied at Göttingen in 1855, and at the Royal School of Mines in Freiberg for the next three years. In 1859–1861 Mr. Hague was engaged in scientific voyages among the islands of the Pacific. During the Civil War he served as judge advocate for the naval courts martial in the South Atlantic blockading squadron cases, in 1862–63. For the next three years he was in charge of copper mines in the Lake Superior region, and in 1867 he became first assistant geologist of the Geological Survey of the Fortieth Parallel. The volume on "Mining Industry" in the Report of the Survey (Vol. III of the series) was the work of Mr. Hague. In 1871 he entered upon the practice of his profession as a Consulting Geologist and Mining Engineer in California, and in 1879 permanently established himself in New York.

Widely known in so many parts of the world, Mr. Hague won without an effort the esteem and personal regard of every one who met him.

A pathetic interest attaches to the paper on The Drake Medal in the August Bulletin. This was Mr. Hague's last composition, written when in his usual health, and partly read in proof a few days before his death.

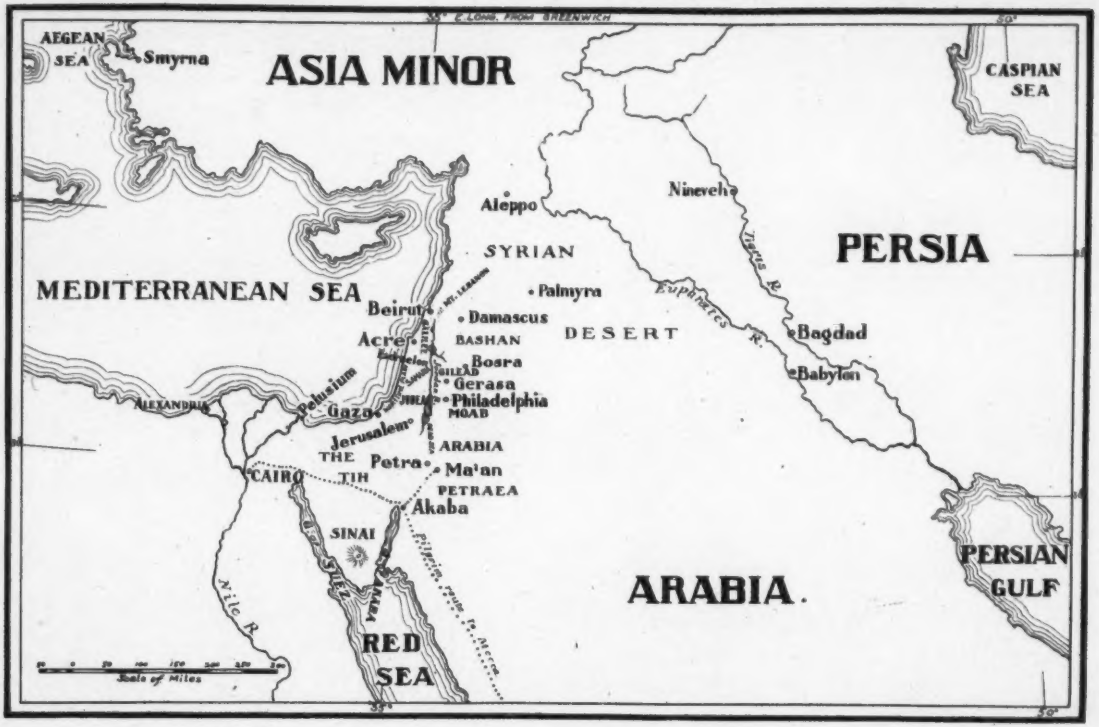
Mr. Hague became a fellow of the American Geographical Society in 1887 and was elected Councillor in 1907 and Vice-President in 1908.

Cesáreo Fernández Duro.

Señor Fernández Duro, President of the Royal Geographical Society of Madrid, died in June after a long illness, at the age of seventy-eight years.

Educated for the navy, he served for thirty years and retired in 1875 with the grade of *capitán de navío*, devoting himself thenceforward with unwearied industry to historical and geographical research and the production of works such as the *Armada Invencible*, the *Disquisiciónes Náuticas*, *Colón y Pinzón*, and the *Armada Española*, a history of the Spanish navy from the union of the Kingdoms of Castile and Aragon. All his writings are marked by the sound historical sense, by scholarship, by impartiality, by the respect for truth and the self-respect inherent in a noble character.

The death of such a man is a loss to his country.



Map of Syria and Surrounding Countries.